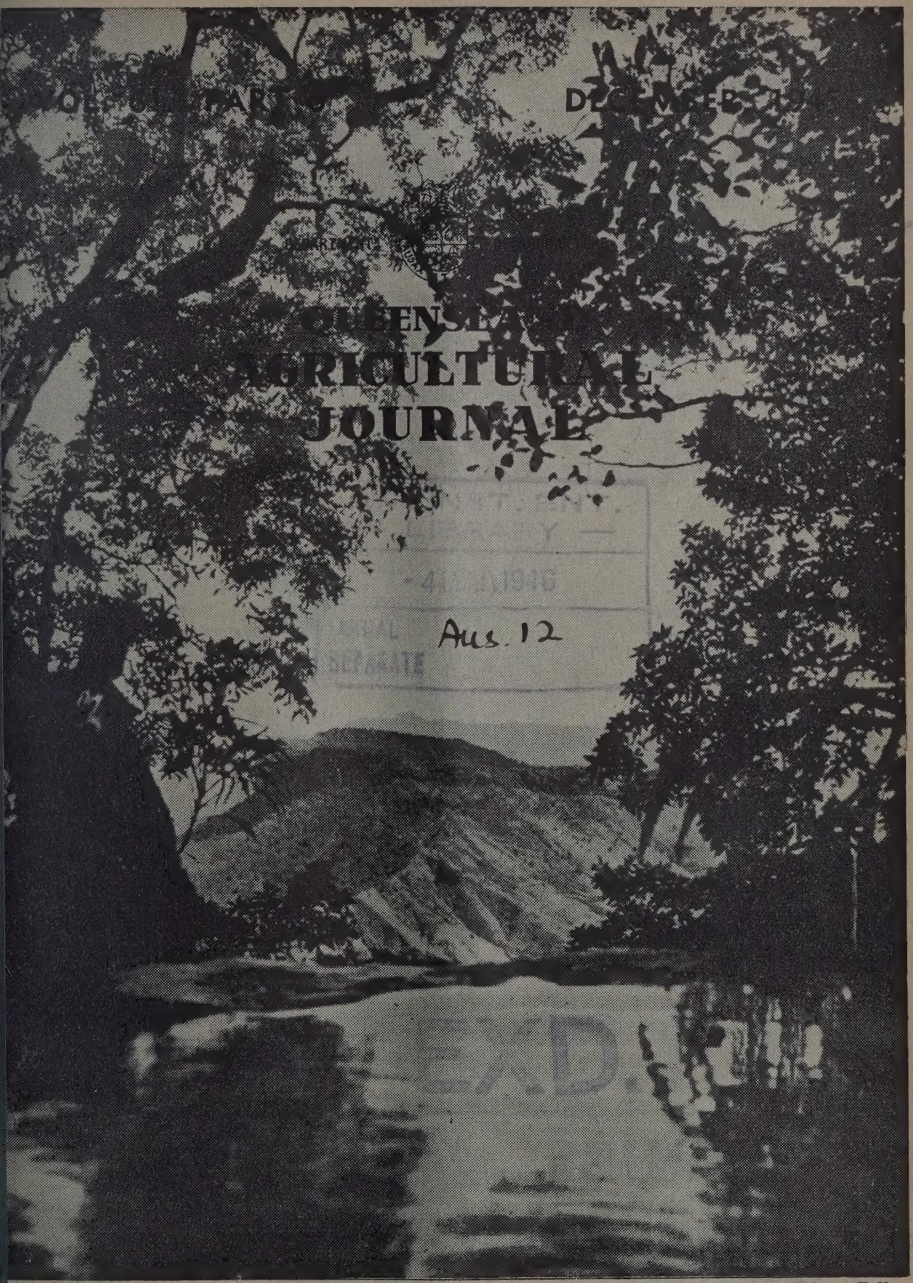

The Pool above Widgee Falls, MacPherson Range, Q.

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Strawberry Culture.

Useful Parasitic Insects.

Post-war Production of Poultry and Eggs.

Animal Disease Control.

Fluorosis of Sheep.

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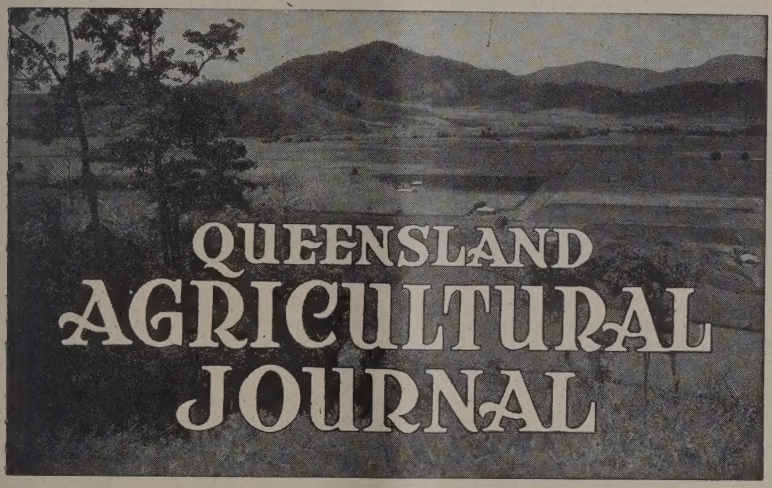

QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Year in Dairying.

ALTHOUGH faced with numerous wartime difficulties, the Queensland dairy industry has achieved a remarkable record, as set out in his annual report to the Minister for Agriculture and Stock (Hon. T. L. Williams) by the Under Secretary (Mr. R. P. M. Short).

Butter production was 95,005,539 lb., valued at £6,498,289. The considerable diversion of supplies to cheese production and to the liquid milk market, which had expanded enormously, was obviously at the expense of butter output. As to quality, only about 7 per cent. of the churnings were other than choice or first grade. In cheese production, the objective set was achieved with an output of 22,627,225 lb., valued at £1,100,000.

In some localities there was a slight diversion of milk from cheese to butter manufacture, but the favourable price relationship of cheese factory to butter factory pays tended towards stabilizing cheese factory supplies. The main factor governing a somewhat lower cheese output was seasonal conditions. Of all the cheese graded officially, over 72 per cent. was of choice and first quality. Refrigeration of cheese-holding rooms is an extending practice and, together with a projected system of payment of differential rates for milk according to hygienic quality, will undoubtedly bring about a further improvement in cheese quality.

Investigations into the making of cheese from homogenised milk were continued, and after successful operations on a commercial scale,

one dairy association has installed a complete plant for supplying a product which does not exude fat when kept at high temperatures for use in tropical climates.

The increasing quantity of milk consumed as a beverage is regarded as a desirable trend in dairying, both from the viewpoint of stabilizing the industry and improving nutritional standards. There is an increasing number of dairy plants which are being equipped for the pasteurization and chilling of milk to meet the requirements of this trade. Milk deliveries at central depots facilitate close scrutiny of bacterial content and quality, and opens the way for more intensive educational activity in the improvement of supplies which on quality tests require higher standards. This part of the work of the Division of Dairying is accordingly becoming of increasing importance.

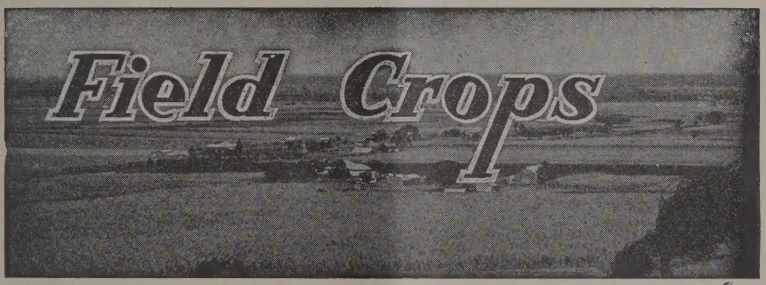
The supply position for machinery and equipment for dairy farming is greatly improving, but the labour force available is still affected by wartime depletion. Releases from the Services will progressively, no doubt, relieve the dairy employment situation.

The activities of the Division of Dairying have been extended by the inauguration of a dairy machinery advisory service, which includes demonstrations in the use, care, and upkeep of dairy farm machinery, particularly milking plants and separators. This service is highly appreciated by producers.

In addition to the control work necessary to ensure the maintenance of satisfactory standards of quality in dairy products, the Dairy Research Branch of the Division was engaged throughout the year on investigations of practical importance to the industry. Besides work on many research projects, tests of sample products in the course of the year aggregated nearly 145,000. In Brisbane, where milk is consumed at the rate of 30,000 gallons a day, and in other large centres, supplies, both raw and pasteurized, were strictly supervised by the technological staff. The butter improvement service completed its fifth year; laboratory bacteriological and chemical tests aggregated just on 25,000. Through these tests it was shown that butter quality is steadily improving, through which the industry is, financially, benefiting very substantially. Included in the year's work were many chemical-engineering surveys of factory equipment, facilities, and layout.

In addition to investigations on milk quality problems, attention was given to efficiency of cooling methods and devices in use on dairy farms.

A notable event of the year was the arrangement of a long-term contract for sales of surplus butter to Britain, of which the main provision is the fixation of a four-year period at prices and on conditions satisfactory to the industry. The Butter Board has continued its full control of the marketing of butter in the metropolitan area, and this has resulted in the saving to dairy farmers of a very substantial sum. Throughout the year the Board continued to pack large quantities of butter for the Allied Services in Australia, the Phillipines, and other islands in the South-West Pacific area. A considerably improved dehydrated product designated "Butter Concentrated Hardened" was produced in the course of the term. Generally, the year in dairying was highly productive in view of all the circumstances and, considering the wartime disabilities, was satisfactory to all concerned.



Agriculture on the Atherton Tableland in 1944-45.

A. HAMILTON, Senior Adviser in Agriculture.

SEASONAL conditions during the year ended 30th June, 1945, contrasted strongly with those of the previous twelve months, during which only 38 inches of rain were recorded. The total rainfall for the 1944-45 period was 95 inches, of which over 64 inches fell in the first quarter of 1945. The rainfall from July to December, 1944, was light and the thunderstorm period did not commence until mid-December. The wet season began in early January and heavy rains were experienced right up until May, with cyclonic weather during mid-March. As will be mentioned later, this heavy rainfall interfered seriously with agricultural production on the Tableland.

Maize.

Small plantings of maize were made during November in areas favoured with early thunderstorms, but general planting was not carried out until mid-December, while a small planting was made in early January. The total acreage planted was 18,703, the December planting being 18,332 acres. Generally speaking, good strikes were obtained, but the rains experienced after mid-January resulted in spindly, yellowish plants, probably because the onset of the wet season so soon after planting leached the soil nitrates into the lower depths of the soil before the young plants could benefit. Considerable damage was caused to crops by cyclonic winds in March.

Heavy rains and the poor root development of the maize crop caused a good deal of soil erosion. This problem will have to be faced not only by the individual farmer, but also by farmers acting in groups in cases where several farms have been affected by the same factor causing erosion. There are many examples of water being turned from roads on to neighbouring farm lands, causing both sheet and serious gully erosion.

The continued wet weather was responsible for heavy infection of maize crops with cob rot diseases, and many crops were rendered entirely valueless in this manner.

Some good crops—over 1 ton per acre—were harvested, and generally these were grown on well prepared land and followed a leguminous crop such as lucerne, cowpeas or peanuts. Such plantings made strong early growth, and maintained a satisfactory rate of development. The percentage of "bad" cobs in the crops following legumes was relatively low.

Tableland maize areas yielded less than one-third of the previous season's yield of 17,000 tons, for about the same acreage sown.

The operation of the Maize Subsidy Scheme during the year 1944-45 may be regarded as quite satisfactory. The Commonwealth Government guaranteed a price of £12 10s. per ton for maize delivered into the silos, and growers for the 1944 crop actually received the second highest return per ton since the inception of the Atherton Tableland Maize Pool. The action of the authorities in confining the sale of the 1943-44 maize crop to the area north of St. Lawrence caused some misgivings at first, but the operation of a Commonwealth Government subsidy on maize purchased for the feeding of pigs, poultry and dairy cattle resulted in a ready sale for the whole of the crop. Dairymen alone purchased 2,314 tons of maize. Stockowners, and particularly dairy farmers, have by the use of subsidised maize learnt the value of supplementary feeding with grain in the production of livestock products, and this should be of immense value to the Tableland maize industry in future years.

Plate 158.
A DAIRY FARM ON THE ATHERTON TABLELAND.

Peanuts.

An area of 442 acres was planted to peanuts during 1944-45. Although excellent strikes were obtained, as with maize the development of the crop was seriously retarded during January and February by heavy rainfall, and serious soil erosion also occurred on peanut land. Weather conditions hampered the early harvest, but yields generally were fair to good, up to two-thirds of a ton per acre having been recorded in some of the drier areas, e.g., Tolga Forest and Rocky Creek areas.

Cowpeas.

The acreage sown for cowpea seed crops was 337, of which 218 acres were planted to Groit and 119 to Giant. The long wet season produced a prolific growth of vine, but seed production was interfered with. In the drier forest areas, however, some heavy seed crops were produced. Losses from mould occurred around Tolga.

Vegetables.

The total of over 6,000,000 pounds of vegetables grown during the twelve months was almost double that of the preceding year. However, with the curtailment of Army orders in June, 1945, the ready sale for all lines which had been operating during the year ceased, and some growers sustained losses.

Up to the end of December, 1944, weather conditions were satisfactory for vegetables, but the heavy wet season made it difficult to prepare land for truck crops and also rendered the weed problem acute. No heavy losses from pests or diseases were experienced; most growers possess spraying equipment and in addition power and other dusters were available through the Vegetable Growers' Association. The increased use of mechanical equipment was a feature of the vegetable industry during the year, and even greater use would have been made of mechanical seeding and cultivating implements had weather conditions permitted it.

Much of the district production was due largely to the efforts of members of the Australian Women's Land Army.

The vegetable growers of the Atherton Tableland and the Mareeba-Dimbulah districts performed a splendid national service from June, 1943, onwards, increasing a very modest production to the extent that they were almost able to meet service demands of up to 109,000 lb. per day. This immense local production eased the transport problem for fresh vegetables for the services stationed in North Queensland, as well as obviating a good deal of wastage which would have been inevitable in perishables shipped from the south during the warmer weather. The effort of the northern farmers was particularly noteworthy when it is considered that the majority had little or no previous experience in vegetable growing on a commercial scale.

The Australian Army engaged in vegetable production on the Tableland from 1943 onwards, its activities from the end of 1944 being concentrated at the Kairi State Farm reserve, where it commenced growing vegetables in April, 1944. Production of vegetables at the State Farm amounted to about 500 tons to the end of June, 1945, and Army production on another farm reached 206 tons.

Lucerne.

Lucerne is receiving increased attention from maize growers. Unfortunately, seasonal conditions during the first half of 1945 resulted in the loss of much prime hay, but growers took full advantage of any good harvesting weather and a large quantity of chaff and hay was marketed. The artificial drying of lucerne appears to have possibilities on the Tableland, as one small farm plant turns out an excellent dried chaff. In the adoption of dehydration of hay crops,

careful consideration will have to be given to the relative advantages of a large central treatment plant and a number of smaller plants distributed throughout the main growing areas. Transportation of green material containing a large proportion of water to a central drier would, it is considered, be less economical from the transport point of view than drying at district plants and carrying the dried material to bulk storage sheds in the drier districts.

Experimental Work.

Owing to a multiplicity of other duties, it was not practicable for the Departmental staff on the Tableland to undertake any major experimental work during the period. For the past three years it has been impracticable to devote attention to the comprehensive legume trials set down on the Tableland some years ago, and a fresh start will have to be made with this work, though seeds of some of the more promising strains of lucerne have been collected.

Preliminary work on the raising of seed of virus-free English potatoes on the Tableland was undertaken, the object being to hold seed from the Tableland August planting until April for planting on the lower Burdekin, and to draw from the Burdekin seed crop for August planting on the Tableland.

Propagation plots of four varieties of sweet potato—Porto Rico, Alton Downs Red, White Maltese, and Sandhills Red—were planted in order to have a source of supply of cuttings available for North Queensland farmers. A yield trial carried out during the year resulted in Porto Rico and White Maltese showing much higher productivity than the other two varieties.

A trial embracing several varieties and crosses of reputedly nematode-resistant cowpeas was laid down at the Kairi State Farm, but failed because of bean fly attack and wet weather.

Plate 159.
DAIRY CATTLE ON A TABLELAND FARM.

Varietal trials with soy beans were laid down at two centres, but weather conditions during the growing period were so unusual that no indication of the suitability of the various varieties for normal Tableland conditions could be obtained. The manner in which the varieties withstood the heavy wet season was remarkable. The varieties

tested were Bansee, Higan, Willomi, Funk's Delicious, Imperial, Jagun, and an unnamed variety. Seed of all varieties was harvested, although considerable difficulty was experienced in drying out the pods for threshing during the wet weather.

Crop Rotations.

The need for a greater use of leguminous crops in rotations on the Tableland has long been apparent. The use of a short-term green manure crop does not appear to be a satisfactory solution, as it has been shown that only the succeeding crop of maize benefits from the turning under of a leguminous cover crop such as cowpeas. Despite a 100 per cent. increase in the maize crop for the one season following green manuring, the practice results in a monetary loss to the farmer when the costs of producing the green manure crop and the fact that the land yields no cash return for that year are taken into consideration. It appears that cash leguminous crops which could be utilised in part by industry, or in the preparation of feeding meals and mashes with maize as a base, have distinct possibilities. Such cash crops in themselves, however, will not solve the problem, but must form part of the farm rotation, to which pasture with its attendant grazing must be added, as a substitute for the present one-crop system of farming so largely practised on the Tableland.

Farm Labour.

Seasonal farm labour required for the harvesting of the maize, peanut and cowpea crops was handled by the District War Agricultural Committee. Prior to the harvesting period of each crop, an estimate was made of acreages sown, time of planting and expected time of harvesting, and the growers' estimates of labour requirements in addition to that of the growers themselves and their families and permanent employees. The casual labour position on the Tableland is always accentuated by the fact that harvesting periods coincide with the sugar-cane harvest, which offers better pay and conditions for seasonal workers. Local labour directed by the district Man Power Officer proved satisfactory, as did aboriginal labour, but there was dissatisfaction with labour directed by Man Power from other districts. The Australian Women's Land Army proved extremely helpful and Army personnel operating on a casual basis were very useful in farm work.

FOR A JIBBING HORSE.

When working a balky horse with a willing worker, this plan for starting the balker has been found effective: With a short, stout rope secure the balker's head to within about 18 inches of the ring in the end of the wagon tongue. This holds him in position, head lowered and body well forward, exactly opposite to the one he assumes when balking. Then shorten the balker's traces so that when his mate is standing even with him, the jibbing horse's traces are taut. If hitched in this way, when spoken to, the willing horse can and will start the load. When this happens the pull of the wagon's tongue on the balker's head will force him to move and pull too.

Strawberry Culture.

C. N. MORGAN, Senior Adviser, Horticulture Branch.

THE production areas of strawberries in Queensland are situated along the coastal strip from the New South Wales border to the far north, with the main producing districts within 150 miles north and 50 miles south of Brisbane. The mild winter of this area lends itself to commercial production of this fruit for a considerable portion of the year, giving, in many seasons, a long picking period frequently extending from early June to the end of November. Owing to the shorter winter, crops in the northern portion of the State have a much shorter season.

Strawberry growing appeals to many farmers, particularly the new man desiring to establish an inexpensive, economical crop on his holding. Appealing features of this crop are a quick return from work that is light, even though constant attention during the cropping season is demanded.

During the early part of the season, the berries sell readily on the open market in Queensland, and many of the bigger growers send interstate. Later in the season, when the market price does not warrant the extra expense of packing, the berries are sent to local canneries for jam making. During the war years the fresh fruit market was able to absorb practically the entire crop, but formerly up to 200 tons of berries were processed in a season. Although strawberry growing appears to be reasonably easy, it is necessary to pay considerable attention to the selection of a suitable site and cultural detail before success is assured.

Location and Soils.

The location of a property for strawberry growing should be in a district with ready access to market, enjoying suitable climatic conditions, and, in many cases, a reliable irrigation supply. The latter condition depends usually on the type of soil to be used, as Queensland generally has a fairly dry winter and some of the sandy or volcanic types of soils quickly dry out. Such drying out results in a rapid drop in production.

Strawberries appear to do well on almost any type of soil, provided climatic conditions are satisfactory, but the most popular are the well-drained, sandy loams, with good water-holding capacity, or, where irrigation is possible, red volcanic types rather than the heavier loams. The latter, however, have the advantage of retaining moisture well; and where the drainage is good may be profitably employed, especially if irrigation water is unprocurable, or in light supply. Normally, in the main areas, frosts are light and do not appear to affect the strawberry adversely and, therefore, there are often portions of many farms which, though during the winter are unsuitable for many other crops, would prove most satisfactory for strawberries. New land has many advantages for strawberries, not the least of these being the freedom from weeds, but old land, well prepared, will grow good crops provided it is well

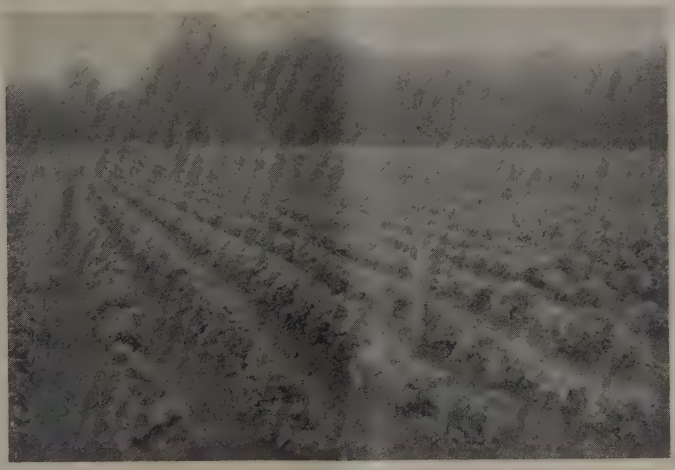


Plate 160.

A Well Grown Strawberry Crop.

supplied with humus, and fertilized correctly. Badly drained soil, whether old or new, is never satisfactory, as it remains too cold and weed growth is most difficult to control; and, furthermore, root rots are very apt to develop under wet conditions.

Preparation of Land.

As planting is done in the autumn, preparation should begin some months before, in order to get the soil into as good a condition as possible. Although the strawberry is not a deeply rooted plant, ploughing of the soil to a depth of eight inches is recommended, as a good depth of well-tilled ground improves the water-holding capacity. Preparation of either new or old ground should begin in the early spring. In the case of the former, it will be necessary to allow it to fallow for two to three months before a second ploughing is carried out. With old ground, a cover crop of Poona pea or corn should be sown during the spring or early summer and ploughed under at least two months before planting. After it has rotted a further ploughing

and subsequent harrowing and cultivation should be carried out until the land is in good condition. Constant cultivation following the final ploughing does much to firm and level the ground as well as control weed growth. Some growers find that strawberries do well on ground following a late spring crop of tomatoes, cabbage, beans, &c., crops which have usually been well fertilized and which leave the land in a good state of cultivation. Preparation of this ground is comparatively easy.

Fertilizing.

Differences of opinion exist as to the best fertilizer for strawberries, but it is usually found that variations in soil conditions call for different treatments as, on a soil rich in organic matter, or following a crop that had received heavy fertilizer dressings, the necessity for heavy dressings should not be as necessary as on a piece of old ground which had not been used for some time. The use of farmyard manure, if procurable, is recommended, and this should be applied to the soil during the final preparation, a few weeks prior to planting.

Commercial fertilizers have proved very satisfactory, particularly on well-prepared ground containing a fair amount of organic matter. As strawberries are planted close and must be kept growing quickly, the base dressings of fertilizer should be fairly heavy, and amounts of from 15 cwt. to 1 ton per acre are not excessive. A complete fertilizer high in phosphoric acid, and containing a medium proportion of nitrogen, is recommended; as many of the soils, particularly the red volcanic, readily "fix" a large proportion of the phosphoric acid and thus make it unavailable, it is advisable to spread the fertilizer in a narrow band about one foot wide along the ground, where the rows will be, rather than broadcast it over the whole area. The fertilizer should be cultivated in about 7-10 days prior to planting. Heavy dressings of nitrogenous fertilizers at planting often cause the plants to produce excessive leaf growth.

Top dressings of fertilizer will probably be necessary during cropping; the extent of these will best be judged by the appearance of the plants and crop. Usually the first top dressing is done at first flowering, and then further dressings as required. Each top dressing should take approximately 1-1½ cwt. of a water soluble fertilizer, fairly high in nitrogen. Top dressings may be applied alongside the plants, or in between the plants in the row, and should be done carefully to avoid dropping the fertilizer on the fruit or leaves, thereby causing burning. After top dressing, if irrigation is available the plants should be watered to dissolve the fertilizer and wash any off that may have fallen on the leaves.

Plant Selection.

Strawberries are grown in Queensland as an annual crop and it is only on rare occasions that the parent plant is allowed to remain in the ground to produce fruit for the second season. The reasons for this are that it is most difficult to keep a big area free from disease, weeds and runners during the hot summer months, and annual planting is strongly recommended.

Whilst it is usually possible to obtain a few early berries from a second season's crop, these do not compare either in size or quality with the first fruits of the new runners. As most growers use their

Plate 161.
Strawberry Plant Commencing to Send Out Runners.

Plate 162.
A Strong, Healthy Runner Suitable for Planting.

own runners, only enough old plants are left to provide sufficient planting material for the following season. From 1,000 to 1,500 plants should provide sufficient runners for an acre, providing they are well tended. It is particularly important to keep plants that are of good quality, true to type and free from disease, as a few undesirable mother plants provide the nucleus for a most unsatisfactory patch of berries after a few years of indiscriminate plantings.

Plate 163.

THE RUNNER SHOWN IN PLATE 162 PRUNED READY FOR PLANTING.

Every effort should be made to encourage the production of sturdy, well-rooted runners. Cultivation of the ground between the rows, watering of the old plants, plus a light top dressing of fertilizer as the runners appear, will help considerably to ensure an adequate supply of good material. Suitable types are shown in Plates 161-163.

Runners usually appear about December, and, therefore, complete weed control is difficult, but should be done as well as practicable before the runners spread out between the rows. Where the runners grow in competition with weeds and are shaded by them, they tend to produce long, weak leaves, which wilt badly after being transplanted. Furthermore, such runners commonly carry numerous weed seeds to the new area. Prior to removing the runners for planting, the beds should be well watered, in order to facilitate digging. Lifting the runners should be done as carefully as possible, and for this purpose a small trowel or a strong-bladed knife will be found most suitable. When free, the roots are trimmed to about three inches and all broken and dead leaves removed. A few of the older leaves also may be removed, if necessary, to lessen transpiration after planting out.

Plate 164.

Correct Depth of Planting is Shown on the Left.

After trimming, the runners should be placed in a bucket containing a little water, or between wet bags. The plants should not be exposed to the wind and sun any more than is necessary. Only healthy runners with a good root system and a well developed crown should be used for planting and only sufficient dug to enable replanting to be started and completed in the one day. The afternoon is the best time for planting out.

In order to avoid injuring plants, it is best to dig the runners by starting at some given point, and not to walk through the area indiscriminately. Growers have often been advised to use only first or second runners as planting material, but when the runners are massed together it is a difficult and tedious job to do this. Furthermore, it has been found that very little difference is apparent between the times of cropping, if care is taken to select sturdy plants.

Planting.

The main month for planting is March, but the operation may be carried through to early April without affecting the earliness of the crop to any great extent. Some growers plant in February, contending that the plants will crop earlier. This is not always the case, however, and February plantings cannot be recommended as a general practice. The hot weather during this month often results in losses, particularly where irrigation is lacking or inadequate.

Care in transplanting is essential, and much of the early losses and ultimate unsatisfactory growth of the plants can be traced to carelessness at this time. The runners must be set at the correct depth, i.e., with the crown just above ground level. Should the crowns be below ground level they often die or make unsatisfactory growth. If they are too

Plate 165.
HAND CULTIVATOR SHOWING HOEING ATTACHMENTS.

Plate 166.
METHOD OF USING HAND CULTIVATOR.

high there is the possibility of the roots drying out. It is only possible to set plants correctly if the rows have been well prepared and levelled by raking or some other such means. Before planting, a wire should be stretched along the row and the plants set along it, in order to keep a straight line. This assists in cultivation, whether horse or hand implements are used.

When planting, the hole may be made by hand or trowel, and should be large enough to take the plants which are set at the correct depth; at the same time the roots are spread in a fan shape. The soil around the roots should be made thoroughly firm, and in this operation care should be taken to avoid getting soil into the crown of the plant. As soon as possible after the plants are set, they should be watered by irrigation or by hand. This should not be delayed longer than after the completion of each row of, say, five chains.

The most popular method of planting is in single rows, the distance between rows and plants depending on type of cultivation, irrigation and disease control to be employed. For horse cultivation, up to 2 ft. 6 in. between rows by 1 ft. to 15 in. between plants is allowed, while for hand cultivation, 2 ft. by 1 ft. to 15 in. is satisfactory.

Numbers of plants per acre are as follows:—

Distance Between Rows.	Distance Between Plants.	Number of Plants.
2 feet	12 inches	21,780
2 feet 6 inches	12 inches	17,424
2 feet	15 inches	17,424
2 feet 6 inches	15 inches	13,939

Plate 167.
FRUIT OF THE PHENOMENAL VARIETY.

Cultivation.

Cultivation between the rows and plants should be carried out to control weed growth. As the strawberry is not deeply rooted only shallow cultivation should be done. A dutch or flat hoe is usually used for close work between the plants and small hand cultivators, fitted with hoeing attachments, are used between the rows. If a horse cultivator is used it may be fitted with "duck-foot" type of tynes to ensure shallow working. When chipping, care must be taken not to pull the soil away from the plants, thus exposing the roots. At the same time, it is essential to avoid any soil lodging in the crowns.

Irrigation.

Irrigation for strawberry growing is highly desirable, as the plants, being shallow rooted, quickly show the effects of dry weather.

On the red volcanic loams it would be difficult to grow a crop through the season successfully without irrigation, except in the high rainfall belt. Some of the other types of soils do not dry out nearly as quickly, and, with reasonably good rains in the spring, will crop well to the end of the season. Most irrigation is done by the overhead system, which appears to be most suitable for strawberries. Watering should be done after picking and should not be excessive but sufficient to keep the plants growing and cropping satisfactorily. Over-watering should be avoided and splashing should be guarded against as far as practicable.

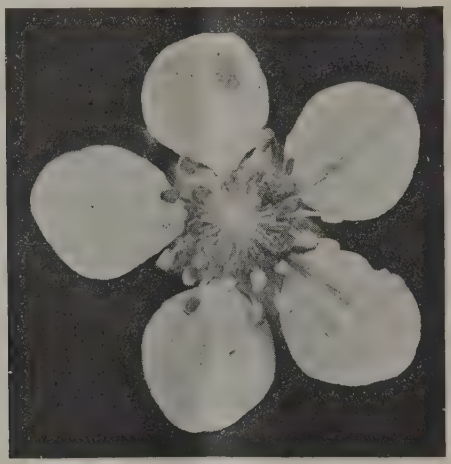


Plate 168.
Type of Flower Containing both Male and Female Parts.

Mulching.

Mulching is not done to any great extent, but, where it is used, has been proved of great advantage. Apart from the aid in controlling weed growth, it helps to prevent evaporation and keeps the berries free from dirt splashed up by rain or irrigation water. Materials for mulching, which are easily obtained, are oak-leaves or blady grass, and, if spread around the plants to a depth of an inch, about six to eight inches on either side, soon settle down to a good, firm mulch. Sawdust is most unsuitable as a mulch, as it sticks to the ripe berries when picking, and is difficult to remove without injuring the fruit.

Harvesting.

Berries should be picked when they are mature, i.e., when they are about three-quarters coloured. To handle the crop successfully, daily picking during the main part of the season is often necessary, and rarely is it possible to allow picking to extend further than every

second day. A pamphlet on the picking and packing of strawberries for market may be obtained on application to the Department of Agriculture and Stock, Brisbane.

Varieties.

There are numerous varieties of strawberries available, but, for our conditions, no others have been obtained which compare satisfactorily with the two which are grown commercially here at present. These varieties are Phenomenal and, Aurie, both of which originated in Queensland. They have proved most reliable over a number of years and do not appear to be showing any decline either in disease resistance or productivity. New growers sometimes purchase varieties from outside the State, but there is nothing to commend this practice, particularly as very serious diseases may be introduced in this way.

Phenomenal is grown to a larger extent than Aurie, although many growers on the North Coast grow the latter with considerable success. Both varieties bear flowers which are self-fertile, i.e., they will pollinate and produce crops without having to be interplanted with another variety. They are vigorous growers, producing medium-sized, highly coloured berries of firm texture. Both are good carriers and suit the market and jam trades.

IS FARMING BECOMING MORE COMPLICATED?

Lots of people still have an idea that farming is easy—all that has to be done is to put a few seeds into the ground, pray for rain and reap a harvest. The fact is that the farmer is very much more than the breaker and the follower of a straight furrow. To be even moderately successful these days, a farmer has to be something of a mechanic, a practical chemist, and a business manager, as well as being skilled in agriculture and animal husbandry. All sorts of unexpected problems he may have to solve at short notice.

The mechanization of the farm and consequent changes in methods have made many new demands. From the cast-iron plough to the multiple-disced cultivator and tractor-drawn header-harvester is a long span. The harvesting of small grain crops is now almost completely mechanized in the United States. But with this expansion in mechanical equipment has come a better understanding of the needs of the soil, of its conservation and its proper use. For example, in the U.S.A. there are now over 1,200 soil conservation districts where the services of technical advisers are available to the farmer. Crop rotation, better use of fertilizer, contour ploughing, strip-cropping and farm forestry lots all come within immediate advisory range, compatible with the study of any other particular farmer's problem. It is estimated that considerably increased farm incomes have resulted directly from this advisory service, so that economically it is obviously of great benefit to the farmer.

In animal husbandry, scientific breeding, feeding and disease control have combined to raise the general quality of livestock. In Queensland, as with agriculture—plant-breeding and so forth—we are following along similar lines with relatively comparable results.

It was once thought that the widespread use of farm machinery in the United States would result in a substantial increase in the number of larger farms. That has not happened; on the contrary, the reverse is true, since small farmers were quick to realize that machines, despite their higher initial cost, are a sound investment in terms of time, reduced labour costs and better crops. The trend over there at the present time is towards the production of still more low-priced machines for the family-sized farm.

PLANT PROTECTION

Useful Parasitic Insects.

J. HAROLD SMITH, Officer-in-Charge, Science Branch.

MOST insects are attacked by other species with predatory or parasitic habits. The former usually prey on insects smaller than themselves and each claims several victims during the course of its lifetime. Parasites, on the other hand, are invariably smaller than the insects attacked and each completes its development on a single individual. The victim is known as the host insect and the larval stage of the parasite is usually responsible for its destruction. The parasitic larva generally lives inside the body of its host, and such terms as egg parasite, larval parasite, pupal parasite, and adult parasite indicate the stage of the host insect which is attacked.

Parasites are not necessarily useful. Those which attack insect pests of cultivated crops and destroy large numbers of them are beneficial. Many, however, attack predators such as the ladybird beetles, or other parasites which help to control insect pests on the farm. Parasites with habits of this kind are harmful. Thus, only a small proportion of the insects with parasitic habits are at all helpful to the farmer. Most play some part, nevertheless, in determining the abundance or otherwise of insects which feed on cultivated and wild plants, for the relationships of pests to their parasites and predators are both complex and intricate.

Most insect parasites belong to a few large groups of wasps and flies. The former includes species in the superfamilies Ichneumonoidae, Chalcidoidea, and Proctotrypoidea; the parasitic flies are mainly members of the family Tachinidae.

ICHNEUMONOID PARASITES.

Ichneumonoids include the largest of the parasitic wasps. Four important families are:—Ichneumonids, the Braconids, the Evaniids, and the Trigonalids. The first two of these families are usually associated with either caterpillar pests of herbaceous plants or the large wood-boring larvae which are found in standing trees. Evaniids are typically parasitic on cockroaches, the eggs of which are destroyed. The Trigonalid wasps are parasites of sawfly larvae.

Ichneumonid Wasps.

Ichneumonid wasps are relatively large insects. They have long, many-segmented antennae, wings with the numerous veins arranged in an intricate pattern and a stalked abdomen which is often laterally compressed and which, in the female, ends in a very long ovipositor. They are usually orange, brown, or black in colour.

Lissopimpla* (Plate 169) is a reddish-brown wasp which attacks caterpillars of the cutworm and army-worm types and is often seen flying just above infested crops or pastures. When the adult wasp finds its caterpillar host, the egg is inserted into some part of the body where the covering membrane is comparatively thin. The larva which emerges from this egg later feeds on the internal tissues of the caterpillar. As the parasitic larva grows, the host becomes sluggish in its

[*Drawing by William Manley.*

Plate 169.

Lissopimpla, an Ichneumonid Parasite of Cutworms × 2.

movements and may be undersized. Before it dies, the caterpillar invariably pupates, but the parasitic larva has by then almost completed its own development and itself pupates, sometimes within the pupa of its host and sometimes alongside it. A common characteristic of the adult wasp is its habit of feeding on exudations from the punctures made in the skin of the caterpillar when the egg is inserted into it.

* *Lissopimpla semipunctata* Kby.

Braconid Wasps.

Braconid wasps are usually smaller than Ichneumonids and they are invariably black in colour with distinctively veined wings characterised by a dark blotch on the front margin. The well-known clusters of small, white cottony cocoons and the solitary brown, felt-like cocoons often seen on the leaves of plants belong to wasps of this kind. Each species seems to prefer one particular type of host. Some, too, show a marked preference for particular kinds of environment outside of which they cannot be found. The life cycle of a Braconid wasp is typically short and seldom extends over more than a few weeks. The eggs are either inserted into the body of the host or laid close to it. The

Fig. 1.

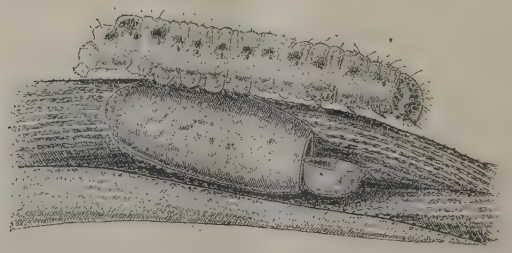


Fig. 2.

[*Drawings by William Manley.*

Plate 170.

MICROPLITUS, A BRACONID PARASITE OF CORN EAR WORM: Fig. 1.— Adult Wasp × 10; Fig. 2.—Cocoon alongside dead corn ear worm larva × 6.

larva, if not already inside the body of the host when it emerges from the egg, soon finds its way there and then develops very rapidly. The young larva often shows a considerable amount of structural ornamentation which disappears as it grows older. Some species exhibit an extraordinary phenomenon in which several larvae develop from a single egg.

Caterpillar pests of cultivated crops are commonly attacked by the parasite, Microplitus.* This wasp (Plate 170; fig. 1) is about one-quarter of an inch in length, almost jet-black in colour, and destroys considerable numbers of the tomato grub† and the cluster caterpillar.‡ Its egg is usually inserted into the first, second, or third larval stages of the host. Occasionally, a later stage may be attacked but the caterpillar is then more or less able to protect itself from the wasp. Inside the caterpillar, the parasitic larva emerges from the egg and develops so rapidly that its host becomes relatively inactive and ceases to feed before it is half-grown. The parasite, which has then completed its larval development, forces its way through the skin of its host and spins an ovoid, brown, felt-like cocoon (Plate 170; fig. 2). This cocoon is loosely attached to the dead or dying caterpillar and the parasitic larva pupates inside it. When the adult wasp is ready to emerge, it cuts a circular hole at one end of the cocoon, forces open the lid and escapes. The caterpillar may survive for some days after the parasite has spun the cocoon, but it does not feed and it finally dies.

[*Drawing by William Manley.*

Plate 171.

Diaeretus, a Braconid Parasite of Cabbage Aphid × 18.

Another Braconid wasp, Diaeretus§, is a well-known parasite of the cabbage aphid‖ and is commonly seen swarming among cabbages, cauliflowers, and turnips infested by the pest. This wasp (Plate 171) is about one-eighth of an inch in length and metallic-black in colour. Its egg is laid on the body of the aphid and the larva emerging from it bores directly into the host. Several parasitic larvae may enter the

* *Microplitus demolitor* Wilk.
† *Heliothis armigera* Hb.
‡ *Prodenia litura* Fab.
§ *Diaeretus rapae* Curt.
‖ *Brevicoryne brassicae* L.

same aphid but they attack and destroy each other until only one survives. Inside the aphid, the parasitic larva first feeds on the fluid body contents of the host and later on the more vital tissues. Ultimately, the whole of the internal organs are destroyed. At this stage, the aphid loses its normal mealy bloom, becomes globular in shape, and acquires a pearl-like lustre. The parasitic larva is then full-grown and spins a cocoon under the body of the aphid so that the aphid, cocoon,

[*Drawing by William Manley.*

Plate 172.
EVANIID PARASITE OF COCKROACH × 3.

and leaf are all joined together. When pupal development is completed, and the adult is about to emerge, the wasp eats a circular hole through the skin of the dead aphid and escapes.

Evaniid Wasps.

The Evaniid wasps* are distinctive, glossy-black insects (Plate 172), most of which are less than one-half an inch in length. They generally attract attention by their unusual appearance rather than by their behaviour or importance. The head and thorax are broad and the abdomen is stalked at its base though it widens at the tip where it ends very bluntly. The hind legs are conspicuous for they seem to jut out from the body of the insect. Evaniid wasps are parasites of

‡ *Evania appendigaster* L. is a common species.

cockroaches. The wasp egg is inserted into a cockroach egg capsule which usually contains several elongate-oval eggs. When the parasitic larva emerges from the wasp egg, it feeds on one cockroach egg after another until all are destroyed. By that time, it is full-grown and pupation takes place within the cockroach egg capsule from which the adult wasp later emerges. Evaniid wasps are commonly seen in cockroach-infested premises.

Trigonalid Wasps.

Trigonalid wasps* (Plate 173) are not unlike the sawflies whose larvae they attack. They are about one-half an inch in length with a comparatively broad abdomen and a somewhat compressed head. Red and yellow or black and yellow colours predominate, these being arranged in a blotch pattern with the lighter colours superimposed on a dark background. The eggs are laid on foliage and are apparently eaten along with the leaves by the sawfly larvae without being injured.

[*Drawing by William Manley.*

Plate 173.
Trigonalid Parasite of Sawfly × 3.

Inside the gut of the sawfly, the egg hatches and the parasitic larva eats its way to the body tissues where it completes its development. Before the parasite reaches maturity, the sawfly grub has spun a cocoon, pupated, and died. The parasite then spins a cocoon inside that of the host and completes its own development. The life cycle of a Trigonalid wasp, like that of its sawfly host, is relatively long, and may sometimes extend over a whole year. If the sawfly grub is captured and eaten by a predatory wasp, the larval Trigonalid may still complete its development at the expense of the new host. This marked capacity for survival is also illustrated by the fact that any other parasite established in the sawfly grub before the Trigonalid, succumbs to the latter insect.

* *Trigonolys maculata* Sm. is a common species which attacks a sawfly pest of gum trees.

CHALCIDOID PARASITES.

The Chalcidoid wasps are mostly small insects with metallic-black, brown, green, or yellow colourings, and characterised by a very simple wing venation. Most of them are parasitic on other insects though some feed on cultivated plants. Examples of the latter are the lucerne seed wasp,* the larvae of which hollow out the maturing seed of lucerne in the field, and the citrus gall wasp† which causes deformities in the twigs of some varieties of citrus.

Fig. 1.

Fig. 2. [*Drawings by William Manley.*

Plate 174.

CHALCIDOID PARASITES: Fig. 1.—Aphelinus, a parasite of the woolly apple aphid × 20; Fig. 2.—Stomatocerus, a parasite of codling moth × 7.

Those Chalcidoids which are parasitic in habit show all degrees of specialisation. Some normally behave as parasites of plant feeding insects though, under some circumstances, they may attack other parasites. Occasionally the two sexes of the one species may develop from eggs laid in quite different hosts. Some species are more akin to predators than parasites for their larvae feed externally on small insects

* *Bruchophagus gibbus* Boh.

† *Eurytoma fellis* Gir.

or their eggs, and not inside any one of them. Unlike the Ichneumonoid parasites, these wasps do not spin cocoons; the pupae are uncovered and occur either in the body of the host or alongside it.

A typical insect in the group is the Eulophid wasp, Aphelinus* (Plate 174; fig. 1), which is native to North America and has been distributed to almost all countries during recent years. It is a parasite of the woolly apple aphid,† which is a world-wide pest of apples, pears, and some other deciduous fruits. Since the introduction of the parasite to Queensland in 1923, the importance of the aphid has declined considerably and the cost of control measures is now relatively small. The wasp is about one-sixteenth of an inch in length and metallic-black in colour. The egg is inserted into the body of the aphid and from it the parasitic larva emerges. This small, pear-shaped larva feeds voraciously on the internal tissues of the aphid and finally kills its host which loses the typical mealy covering before death. The full-grown parasitic larva pupates inside the dead aphid and, after a few days, the adult wasp emerges through a circular hole in the upper surface of the host. The life cycle of the parasite is completed in approximately thirty days and populations can therefore increase very rapidly when the weather is mild and aphids are abundant. Though Aphelinus is numerous during the autumn in the important deciduous fruit district of Stanthorpe, few parasites survive the cold winter and the woolly apple aphid may therefore become troublesome to the orchardist during the spring. Sprays may then be needed to check it. By midsummer, however, the parasite is again active and able to control the pest for the remainder of the season.

A parasite with rather different habits is Stomatocerus‡ (Plate 174; fig. 2), often bred from the pupae of the codling moth§. This wasp is black in colour, about three-eighths of an inch in length, and has thick hind legs. The egg is laid in the late larval or early pupal stages of its host and the parasitic larva feeds on the internal tissues of the caterpillar or pupa. When full-grown, the parasite pupates within the cocoon of its host, from which the adult wasp later emerges. Usually only one parasite emerges from each host even though several eggs may have been laid in it earlier. The life cycle may be completed in three weeks but the adult can survive for several months.

PROCTOTRYPOID PARASITES.

The Proctotrypoid wasps are small, metallic-black insects with a slightly more elaborate wing venation than that of the Chalcidoids from which they are technically separated by differences in the thorax and the limbs. The group exhibits a wide diversity of habits though each species is restricted in its choice of hosts. Several species attack insect eggs but nymphal locusts, grasshoppers, and lacewings are also parasitized by wasps of this kind. In Queensland, two of the best known species are egg parasites, one of them being introduced to the country while the other is native to it.

The very minute and rather squat looking Microphanurus‖ (Plate 175; fig. 1) is an egg parasite of the green vegetable bug.¶ The female wasp punctures the egg of the bug and inserts its own, sometimes at

* *Aphelinus mali* Hald.
† *Eriosoma lanigerum* Haus.
‡ *Stomatocerus pomonellae* Cam.
§ *Cydia pomonella* L.
‖ *Microphanurus basalis* Woll.
¶ *Nezara viridula* L.

the side and sometimes through the cap. Usually, all the eggs in any one cluster laid by the host are attacked at the same time and it is seldom therefore that both bugs and parasites are bred from a single egg mass. Inside the bug egg, the parasitic larva develops very rapidly and is full-grown in seven to fourteen days. Pupation takes place inside the bug egg and the adult wasp later bites its way through the cap and escapes. As a rule, the first wasps to emerge are males and they remain in the immediate vicinity until the females appear. Perhaps this explains the frequency with which the parasites are observed on egg masses of the bug in the field. Mating occurs as soon as the females emerge from the egg and the life cycle begins again. Characteristically, the egg mass of the green vegetable bug acquires a pinkish tinge two

Fig. 1.

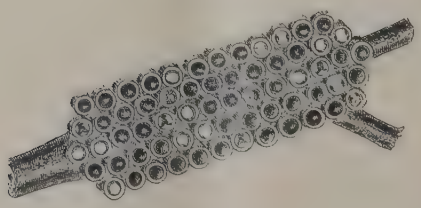


Fig. 2. [*Drawings by William Manley.*

Plate 175.

MICROPHANURUS, A PROCTOTRYPOID PARASITE OF GREEN VEGETABLE BUG: Fig. 1.—Adult wasp × 16; Fig. 2.—Parasitized egg mass, wasp emergence already begun × 2.

or three days after it is laid; when parasitized, however, this pinkish tinge fails to develop and the eggs become slaty-grey in colour. The parasite sometimes destroys most of the eggs laid (Plate 175; fig. 2) and young bugs are then scarce even though adults are numerous and egg masses can be easily found. Outbreaks of the bug may last for some months for, even though its egg parasite is active, the adult bug can survive for relatively long periods, particularly during cool weather. Since the introduction of Microphanurus to Queensland, outbreaks of the green vegetable bug have been less frequent and somewhat less injurious.

Several small wasp parasites attack the eggs of locusts and grasshoppers. One of these, Scelio,* is about one-quarter of an inch in length and black in colour (Plate 176). Its host is the Australian plague locust.† Enormous numbers of this parasitic wasp are sometimes seen on locust egg beds when they are being established and later, when the young hoppers are beginning to emerge from them. In the former case, the parasite is attacking the newly laid eggs of the locust; in the latter, the wasps have emerged from the eggs and are flying just above ground level. The locust inserts its eggs into the soil where several are embedded in a frothy secretion which becomes the typical egg capsule. These capsules are concentrated into egg beds, the size of which depends on the density of the laying swarm. The adult wasp

[*Drawing by William Manley.*

Plate 176.

Scelio, a Proctotrypoid Parasite of the Australian Plague Locust × 10.

has very strong forelegs and it burrows through the more or less soft froth to the locust eggs. On reaching them it inserts one of its own eggs in each of the locust's before returning above ground. A parasitic larva later develops within each locust egg. This phase of its life cycle is completed in a period comparable with that required for the incubation of the unparasitized locust egg, hence, when hoppers first appear on an egg bed the wasps, if present, are also ready to emerge from the eggs of their host. The adult cuts a circular hole in the end of the egg which encloses it and forces a path through the capsule and the overlying soil to the surface. This parasite may accompany adult locusts during migratory flights. Nevertheless, it is unusual for Scelio to be numerous in any district until one or more generations of the locust have been completed there.

TACHINID PARASITES.

Tachinids are by far the most important group of parasitic flies and several have been used in biological control work. They are stout-bodied insects of varying size and many resemble blowflies in appearance though somewhat more robust and hairy. The colour is usually grey or black but some have an orange-red abdomen. A few which are parasitic on wasps have yellow markings on the body. Tachinids can be separated from superficially similar insects by the structure of the antennae, the terminal segment of which is either free from, or only

* *Scelio fulgidus* Crawf.

† *Chortoicetes terminifera* Walk.

partly covered with, hairs. Most of the larger insect pests are attacked by Tachinids though the better known species are parasitic on the larvae of moths or beetles. Some select their host with great care but others attack several different and quite unrelated insects.

The adult flies normally feed on the secretions of scale insects or the nectar of flowering plants. Eggs may be laid on foliage which is later consumed by the host or they may be attached to, or inserted into, the insect itself. Occasionally, the eggs hatch inside the body of the parent fly and the parasitic larvae are then laid on or near the host insects. These hosts are usually the immature stages of other insects, though in some bugs, beetles, and locusts the parasite may not complete its development until the host has reached the adult stage. The parasitic larva invariably makes its way into the body of the insect, either through the skin or, if the eggs are first ingested with the food of the host, through the gut. Once inside the host, feeding takes place until the parasite is full-grown when it pupates in the body of the victim or alongside it. The adult Tachinid later emerges from the pupa and, if necessary, forces its way through the cocoon or pupa of the insect which has been destroyed. The length of the life cycle varies with the species concerned; in some, it may be completed within three weeks while, in others, it may take the greater part of a year.

The life histories of few Queensland species are known in detail, though their importance is shown by the large numbers seen in the field during outbreaks of such pests as army-worms and leaf-eating caterpillars.

[*Drawing by William Manley.*

Plate 177.

CEROMASIA, A TACHINID PARASITE OF THE CANE BEETLE BORER × 5.

One well-known Tachinid, Ceromasia*, was introduced to Queensland in 1910 for the control of the sugar-cane beetle borer.† It is a small fly (Plate 177) which is native to New Guinea. When brought to Queensland, releases were at the same time made in Fiji and Hawaii where the beetle borer is also a pest. In Hawaii, crop wastage caused by the pest has since decreased, but in Fiji and Queensland the position remains more or less unchanged. Possibly, climate and cultural practices differ in the three areas and affect both pest and parasite in

* *Ceromasia sphenophori* Vill.

† *Rhabdocnemis obscura* Boisd.

different ways. Ceromasia resembles a housefly in appearance, but its jerky flight and preference for open country help to distinguish it in the field. The larvae of the sugar-cane beetle borer make holes—at intervals along their tunnels—in the surface of the cane and Ceromasia lays its eggs or, if development in the parent fly has proceeded far enough, larvae in or near these openings. The parasitic larva then penetrates the burrow occupied by the borer, enters the body of the grub and ultimately kills it though not before it has constructed a cocoon. The parasitic larva, when full-fed, pupates inside this cocoon and the adult Ceromasia emerges later. More than one fly may be bred from a single cocoon, but they are smaller than usual. The adult flies are sometimes seen feeding on the nectar of Euphorbiaceous plants.

A second Tachinid fly, Winthemia,* is often reared from caterpillars such as the corn ear worm and army-worms. It is about one-half of an inch in length, broad bodied with a pale blotch on each side of the abdomen (Plate 178). The life history of Winthemia has not been worked out in detail, but the facts so far recorded suggest that the insect behaves in much the same way as well-known related species overseas. Two or more large, whitish, oval eggs may be found on the thorax of a single caterpillar in positions from which the host cannot

[*Drawing by William Manley.*

Plate 178.

WINTHEMIA, A TACHINID PARASITE OF CORN EAR WORM × 3.

easily remove them. The parasitic larva emerges from the under side of the egg and penetrates directly into the body of the caterpillar where it feeds on the internal tissues. Once inside the host, the larva probably breathes through a funnel-shaped structure, the narrow end of which pierces the skin of the caterpillar. The parasite remains in this funnel until its host pupates and dies, but it then moves freely through the pupa and feeds on the decaying contents. When full-grown, the parasitic larva pupates in or alongside its host and the adult Winthemia emerges some days later. This Tachinid normally completes its life cycle in approximately three weeks during the summer; in cooler weather the period may be much longer.

* *Winthemia lateralis* Macq.

Fluorosis of Sheep in Queensland.

G. R. MOULE, Veterinary Officer, Sheep and Wool Branch.

RECENT investigations have shown that the waters from many of the artesian and sub-artesian bores in Queensland contain minute quantities of chemical compounds of fluorine, a substance which may have when taken in small daily amounts by young animals a deleterious effect on the development and subsequent wear of the teeth. Excessive quantities ingested regularly and over a period of time cause symptoms of a more severe form of poisoning, and these appear irrespective of the age of the animals. The clinical manifestation of the symptoms of fluorine poisoning is referred to as "fluorosis." Certain forms of phosphatic licks contain fluorine. During the 1926-8 drought some of these phosphates were fed to sheep in the central-west and clinical signs of fluorosis developed in some of the animals.

The occurrence of fluorine in bore waters can be demonstrated only by chemical analysis, as the fluorine compounds do not impart any distinctive taste or smell to waters.

The Normal Fluorine Requirements of Animals.

If fluorine is entirely absent from the diet of very young animals when the secondary teeth are developing under the gum, a peculiar type of permanent tooth, which will not stand up to "grinding work," forms and wear is excessive and uneven. This condition appears to be fairly common in certain countries, and in these it is common practice to add fluorine to the drinking water at the rate of about 1 part per 2,000,000 parts of water. When present in this proportion fluorine ensures the development of naturally hard teeth which do not exhibit abnormalities as a result of wear.

The Intake of Excessive Quantities of Fluorine.

Many bores in Queensland are delivering water which contains fluorine at more than 3 parts per 1,000,000, and in one case 40 parts per 1,000,000 was recorded.

Under western conditions, where evaporation is high, the amount of fluorine increases as the water flows along bore drains or stands in holding tanks and troughs. It is thus difficult to state the amount of fluorine which must occur in the water delivered at the bore head before symptoms of fluorosis occur, but water containing 2 parts per 1,000,000 has sufficient fluorine to produce symptoms in the teeth of young animals.

Toxic Action of Fluorine.

The effects produced by the fluorine depend upon—

(i.) The daily intake of fluorine;

(ii.) The continuity of intake and the period over which the sheep are subjected to fluorine intake;

(iii.) The age of the sheep.

When fluorine is taken into the animal's body, insoluble fluorides are formed in bones and teeth. If the fluorine intake is high and regular a "saturation point" is reached, when bones and teeth exhibit characteristic abnormalities and symptoms of toxicity may develop.

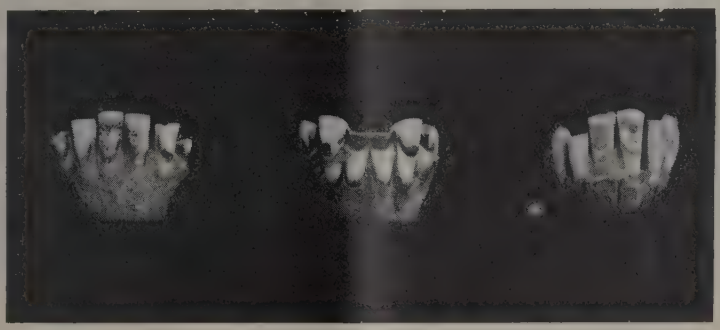


Plate 179.

SHOWING TEETH OF THREE SHEEP SUFFERING FROM FLUOROSIS.—Left: Teeth from animal following irregular intake of unsuitable water during its first year of life. Centre: Teeth from a 6-tooth sheep on unsuitable water from an early age. Right: Teeth from a sheep subjected to an intermittent intake of unsuitable water during its growing period.

If the fluorine intake is irregular—as, for example, when the sheep for a portion of each year are drinking rain water or other water free from or low in fluorine and for the rest of the year are on water containing toxic levels of fluorine—this "saturation point" is reached much more slowly. Experiments indicate that if even large doses of fluorine are given each day to adult sheep until symptoms of general poisoning result, recovery may take place if the fluorine intake ceases before the case is too far advanced.

The age of the animal is of importance, because fluorine has a marked effect on tooth development. The secondary or permanent teeth pass through well-established stages in their formation. The last step before eruption includes the deposition of the hard enamel coating on the outside of the tooth. Once the deposition of enamel is completed, fluorine has no effect on teeth. Observations made on some jaw bones from sheep grown in western Queensland indicate that the deposition of the enamel on all the molar or grinding teeth is completed by the time the "four tooth" incisors (front teeth) are in wear. At this stage, however, the enamel is not formed on the corner incisors, which usually erupt at about three years of age.

There is evidence to indicate that when in-lamb ewes are subjected to an excessive fluorine intake some of this poison is transmitted to the lamb before it is born. It also appears that the milk from ewes which have a high fluorine intake also contains fluorine, and in this way suckling lambs would be subjected to a fluorine intake from the time of their birth. This aspect of the problem is under investigation at the present time.

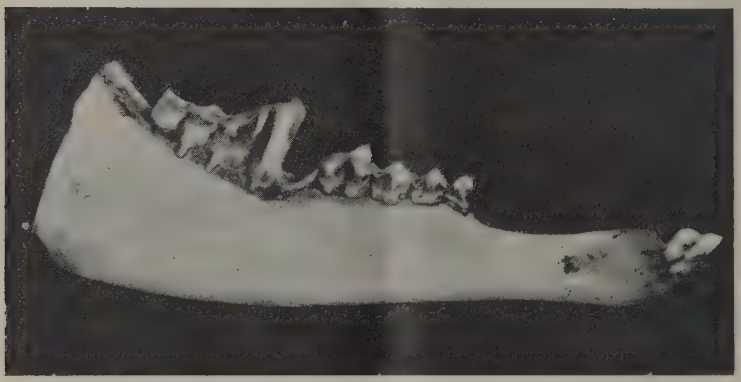


Plate 180.

SHOWING THE WEAR ON THE MOLAR TEETH OF THE ANIMAL WHOSE LOWER JAW BONE IS SHOWN IN THE CENTRE OF PLATE 179.

Symptoms of Fluorosis.

The symptoms most commonly noticed under field conditions relate to abnormalities of the teeth. In view of the factors discussed above, it is obvious that the symptoms of fluorosis may vary. If the fluorine intake is excessive during the stage of enamel deposition, a soft enamel, showing characteristic pitting with a brown staining giving the tooth a mottled appearance, develops. Exactly which teeth are affected depends upon the age of the animals when they are subjected to a fluorine intake. Plate 179 shows the front teeth of three animals which were subjected to an excessive fluorine intake during various stages of their growth.

The jaw bone on the left is from an animal which was subjected to an irregular fluorine intake of 6 parts per 1,000,000 in the drinking water during the first year of its life. The typical mottled appearance of the enamel is obvious, and the chipping of the front edge of one of the "four tooth" teeth is also noticeable. This chipping of the wearing edge is characteristic of the teeth of animals suffering from fluorosis and is probably a contributing factor to the rapid and irregular wear of the teeth.

The centre jaw bone is from a 6-tooth animal which was subjected to a regular fluorine intake of about 12 parts per 1,000,000 in the drinking water from the time the animal commenced to drink. The central incisors (two teeth) are completely worn away; the brown staining and pitting of the enamel of the other teeth present is also noticeable.

The jaw bone on the right is from an animal which was subjected to an intermittent fluorine intake during its growing period. The abnormal appearance of the two teeth is obvious, as is the excessive wear of the four-tooth incisors.

Plates 180 and 181 show the back or molar teeth of sheep which were suffering from fluorine poisoning. The jaw bone in Plate 180 is the centre figure of Plate 179, and the excessive wear which is exhibited by these teeth leaves little doubt as to the affected animal's inability to masticate its food. Plate 181 shows the back teeth of an older sheep which has been subjected to an excessive fluorine intake. The uneven wear of the grinding teeth is obvious.

In the initial investigation into fluorine poisoning of sheep carried out by the Council for Scientific and Industrial Research, it was found that a daily intake of a small toxic dose of fluorine, when it occurred in phosphates, caused a depression of appetite and retarded the rate of growth of young sheep. When massive doses of fluorine were given to adult sheep each day, the animals lost about 45 lb. in weight in twenty weeks, but about 35 lb. of this decline was recovered in about twenty-five weeks after the cessation of fluorine administration. If the fluorine intake was continued, however, the animals showed extreme emaciation and disinclination to eat and finally died. These symptoms may be regarded as those of a general poisoning resulting from excessive fluorine intake, and in these cases abnormal swellings and bony outgrowths are sometimes seen on the bones.

It has been found that far smaller doses of fluorine in the soluble form which occurs in bore waters are sufficient to poison sheep and bring about dental changes than of the form of fluorine present as a contaminant in certain phosphates.

The Economic Importance of Fluorosis.

The economic importance of the occurrence of excessive quantities of fluorine in bore waters may be set out as follows:—

(1) The damage to the teeth of young sheep is irreparable. Animals bred in areas where fluorine occurs and subsequently moved to districts where the food is of a coarser and rougher type are often unable to thrive owing to their inability to masticate properly. Retardation of growth and destruction of teeth of young sheep caused by a regular fluorine intake in excess of the normal requirements of sheep may render properties served by fluorided bores unsuitable for sheep breeding.

(2) The reputation for bad mouths earned by sheep suffering from fluorosis makes it difficult for breeding properties to sell their wethers and in many instances requires that they be disposed of as weaners.

(3) The decrease in body weight resulting from the toxic effects of large doses of fluorine on adult sheep may cause difficulty in fattening sheep for market.

(4) To alleviate the effects of fluorosis, large capital outlay is required in providing alternative sources of water not heavily contaminated with fluorine compounds.

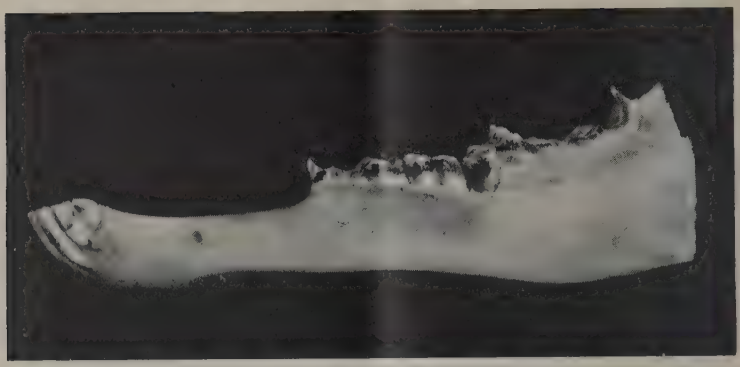


Plate 181.
SHOWING THE MOLAR TEETH OF A FAIRLY OLD SHEEP SUFFERING FROM FLUOROSIS.

Prevention of Fluorosis.

As medicinal treatment of sheep suffering from fluorosis is not successful, managers of properties where fluorided bore waters occur should adopt preventive measures.

To this end, in-lamb ewes and young sheep (up to 4 tooth) should be kept off fluorided waters. This may mean the provision of surface water, though if it is found that some of the bores on the property do not contain toxic amounts of fluorine the paddocks watered by these bores may be used for the lambing and for growing young sheep.

When it is not possible to keep young animals entirely off unsuitable water, the effects may be minimised by depasturing these animals in such a way that they will get a minimum intake or so that their fluorine intake will not be continuous. This means that the animals should be run in those paddocks near the bore head, where the concentrating effects of evaporation are at their minimum. In the case of sub-bores, the troughs and tanks should be drained regularly and frequently, and where possible the stock should be subjected to intermittent watering at affected water sources by changing them to a fluorine-free water now and again.

As older sheep can handle larger daily doses of fluorine than young ones, it is suggested that adult animals, other than in-lamb ewes, should be run in those paddocks where the maximum concentrations occur, but should the daily intake be excessive their sources of water should be alternated.

"PINCUSHION" FOR THE PITCHFORK.

Instead of standing a pitchfork in the corner of a feedway in the barn, or leaning it against a manger, stick it in a sack filled with chaff tightly packed. With the tines shielded in this way, there is little danger of injuring your leg or foot on them if the fork should be knocked over unnoticed.

Post-war Production of Poultry and Eggs.

P. RUMBALL, Officer in Charge, Poultry Branch.

POULTRY raising is receiving the consideration of many people who are contemplating engaging in the industry as a means of livelihood in the post-war period. In order that the prospects of the industry can be judged by them, the following review of wartime expansion and of pre-war production and marketing is given.

During the war every effort was made to stimulate the production of eggs and poultry flesh to meet the requirements of the Services and of the Empire. With the termination of hostilities the requirements of the Services, both Allied and Empire, have been reduced and will eventually cease; and the only markets that will be left are the Australian civilian requirements and overseas demands, principally those of Great Britain.

Rationing of Foodstuffs.

With the shortage of poultry foodstuffs which occurred in the early part of 1945, it was found necessary to introduce a system of rationing. To do this, returns were sought from farmers and others raising poultry in order to ascertain the number of laying and breeding birds, the number of pullets 6 to 24 weeks of age, the number of chickens under 6 weeks old, and the number of cockerels being raised for table purposes. Provision also was made for returns with reference to ducks and turkeys. The following table, prepared from the applications received, gives collectively the number of hens and pullets 6 to 24 weeks of age in the various sized flocks:—

Division No.	Under 39.	Number of Birds in Flocks.							Total.
		40–99.	100–499.	500–799.	800–1,199.	1,200–1,484.	1,485–5,000.	5,000 Upwards.	
1	56,637	49,855	81,162	29,417	33,670	..	83,886	6,000	340,627
2	935,550	436,954	500,732	287,910	324,994	5,150	667,649	68,771	3,227,710
3	124,656	116,171	109,054	46,065	32,623	1,200	61,577	..	491,346
4	33,348	35,518	23,396	7,945	1,730	..	17,017	..	118,954
5	60,606	77,290	60,790	10,248	12,356	1,200	32,978	..	255,466
6	70,791	108,560	78,432	25,918	14,565	..	41,582	..	339,848
	1,281,588	824,348	853,566	407,503	419,938	7,550	904,687	74,771	4,773,951

In the compilation of the above table the State was divided into six divisions, so that the intensity of poultry raising in each division could be determined. Following is a description of the divisions:—

Division 1.—The Darling Downs and the area west of the Darling Downs to the South Australian border.

Division 2.—The area east and north of the Darling Downs from the New South Wales border in the south to the township of Rosedale in the north, and south of a line drawn from Rosedale to Tambo, the area on the south-east being bordered by the Darling Downs.

Division 3.—The area north of Rosedale bounded on the south by a straight line from Rosedale west to the South Australian border, and on the north by a straight line drawn between Boulia and St. Lawrence.

Division 4.—The area north of the northern boundary of division 3; the northern boundary of this division extending along a line drawn from Bowen to Morella (south of Winton).

Division 5.—The area north of the northern boundary of divisions 4 and 5, to a straight line drawn between Rollingstone and Camooweal.

Division 6.—All the area north of the northern boundary of division 5.

The food which could be allocated to these various groups was insufficient for the maintenance of the whole of the flock (a laying hen requires in four months approximately 15 lb. of mash). Mash was made available for a four-month period, as follows:—

Householders—	
With a flock of under 39 ..	1 cwt. of prepared mash.
With a flock of from 40 to 99	2 cwt. of prepared mash.
Farmers with—	
100 to 499	11 lb. of prepared mash per b'rd.
500 to 799	14 lb. of prepared mash per bird.
800 to 1,199	13 lb. of prepared mash per bird.
1,200 to 4,999	10.5 lb. of prepared mash per bird.
5,000 or more	10 lb. of prepared mash per bird.

Egg Production.

If these poultry population figures be accepted as a basis, notwithstanding the fact that they may be inflated (inflation would be no greater in one area than another), they may be used to gauge the production of the whole of the State.

In the controlled area where all production from 40 or more fowls passes through the Queensland Egg Board, there are 2,576,150 fowls owned by persons with flocks of 40 or more. There is every indication that the quantity of eggs which will be marketed through the Board from this source will reach 11,000,000 dozen for the year 1945-46. In the uncontrolled area—i.e., divisions 3 to 6—there are 915,153 fowls kept by persons with flocks of 40 or more. These birds, producing at the same rate as those in the controlled area, would lay 3,960,000 dozen eggs annually. Therefore, theoretically, the total State production from flocks of 40 or more would be approximately 15,000,000 dozen eggs. In addition to this is the production from household flocks; these number a little in excess of 1,250,000 birds, from which an annual production of 5,000,000 dozen eggs could be expected. Under

this method of calculation, the total production from the domestic hen, for the whole of the State which has been supplied with rationed foodstuffs, should be in the vicinity of 20,000,000 dozen eggs.

If this were actually the total production of the whole of the State, it should be possible with a population of a little in excess of 1,000,000 for these eggs to be consumed within the State by the cold storage of the surplus during the spring for subsequent winter requirements.

However, further examination of the position discloses that more than 80,000 domestic rations were issued. It could be presumed that some of the product from these birds would supply the needs of 80,000 families. Therefore, the effective consuming population of the State would be reduced by this source of supply by 300,000 to 400,000 persons. In addition, there is the general farmer who has fowls for the production of eggs and poultry meat for household needs, but who does not purchase poultry foods. Just how extensive this class is, it is impossible to indicate; but in one district where a close inspection was necessary because of disease, it has been ascertained that fewer than 25 per cent. of farmers raising poultry have applied for foodstuffs for the feeding of their birds.

Collectively, such flocks would make a big addition to the total egg production and would reduce the consuming potential of Queensland for eggs produced for sale.

Pre-war Yields.

What was the production before the war? In the pre-war period, control was exercised by the Queensland Egg Board over the production of 50 or more fowls. The controlled area was approximately the same as it is to-day. The average receipts at the Queensland Egg Board from 1934 to 1940 were 5,000,000 dozen eggs. It is estimated that the production in the outer areas, or districts 4 to 6, would then have been about 3,000,000 dozen eggs, but it could have been less. It also is estimated that the household production may have been in the vicinity of 2,000,000 dozen eggs. On this assumption, the pre-war production of the State was approximately 10,000,000 dozen eggs.

In the pre-war period, the Queensland Egg Board had to export approximately 2,000,000 dozen eggs of the 5,000,000 dozen handled by that body, since an Australian market could be found for only 3,000,000 dozen. There appears to be to-day in the uncontrolled portions of this State an egg supply greatly in excess of local requirements, while the Egg Board has received approximately 8,000,000 dozen in excess of pre-war domestic requirements. It may be claimed that overseas export can absorb the surplus production, but there is one factor, however, which is the first essential for export, and that is egg quality.

Fluctuation in Output.

Egg production is not maintained at a uniform level throughout the year because of climatic conditions, the period of the year when the young birds come in to lay, and the moulting of birds at the termination of their first year's lay. The commercial poultry raiser, with good management, experiences a higher yield in the period of short supply than the householder and the mixed farmer, but no system of management can bring about a uniformity in the rate of production; therefore, the intake of eggs by a marketing organisation such as the Queensland Egg Board is probably the best means of obtaining a picture of the fluctuation in production from month to month. The following table gives the intake of eggs at the Queensland Egg Board

for the years 1941-42 and 1942-43, and the anticipated intake on an annual production of 11,000,000 dozen:—

Month.	1941-42.	1942-43.	Anticipated Intake on Eleven Million Dozen.
January	573,163	604,870	902,000
February	368,565	462,991	636,900
March	392,379	521,050	621,500
April	229,313	361,524	537,900
May	370,898	402,767	588,500
June	315,401	388,485	533,500
July	544,170	464,356	775,500
August	960,650	945,105	1,468,500
September	898,569	896,552	1,378,300
October	850,166	1,053,363	1,461,350
November	894,002	715,269	1,235,850
December	536,158	523,904	830,500
	7,043,434	7,240,236	10,970 300

It will be seen from this table that approximately 50 per cent. of the intake occurs during the months of July to October, inclusive. This is the main exporting period. It had been found necessary in the pre-war period to commence packing for export about mid-June and continuing well into December, because of lack of demand on the Australian market.

The Export Market.

Extending the period of packing for export until after the second or third week in November does not permit of eggs arriving in Great Britain until January. The overseas values are then declining and the quality of the egg at the time of packing, because of the warmer conditions then applying in Australia, is not as high as in the earlier months of the year, with a consequence that a lower percentage is of export standard.

British producers object to imports of eggs after January as their birds are then entering the season of high production. This objection may not be serious during the first year or two in the post-war period, but as the industry in Great Britain is re-established (and to-day it is 70 per cent. of the 1939 standard), such objection may have a very serious effect on the marketing outlook for eggs imported from Australia.

A high quality egg is the first essential for export, as it is the only class of egg which will stand up to the inevitable lengthy period of storage and transport. When eggs do not come up to this high standard, export is prohibited under Commerce Regulations, because of the adverse effect such eggs may have on overseas values. Marketing organizations are therefore unable to relieve the local market of surpluses.

To overcome the difficulties which will be associated with marketing in the post-war period, it will be necessary to increase the local consumption of eggs above the pre-war level. To do this, high quality eggs are essential, and an improvement in the general quality of our eggs will permit of a greater percentage being exported. Unless the local consumption can be increased beyond pre-war levels, it may be essential to export 80 per cent. of the eggs produced. The quality of the egg received by marketing organizations to-day will not permit of this being done. In fact, it is almost an impossibility with the best of attention to produce eggs of which 80 per cent. are of exportable quality.

ANIMAL HEALTH

Animal Disease Control.

IN veterinary practice to-day the prevention of disease is more strongly stressed than curative treatment. The following account of the activities of the Division of Animal Industry within the Department of Agriculture and Stock* during the year ended 30th June last, particularly in respect of disease and pest control, is of especial interest to Queensland stockowners.

Cattle.

Buffalo Fly.—A further extension of buffalo fly infestation is reported. On the coast the fly spread from a point just south of Bowen to a point between Bundaberg and Gladstone, and was probably carried by cattle travelling by train, for by spraying it is impracticable to completely rid heavily infested animals of the pest. Spraying plants in use have been advanced from point to point to coincide with fly movements. At present, two plants are in operation at Bororen and Isis Junction, respectively.

Early in the year a brochure was prepared setting out details of the trapping box. Since its publication, many traps have been erected and the general opinion is that they have been very effective in controlling the fly in areas where they have been placed.

Experimental work also has been continued with lethal spraying fluids, mainly with D.D.T. as the toxic agent. Experimental work is being directed towards using both D.D.T. and the trap. It is believed that with a combination of the two it will be possible to keep the fly under control on dairy farms at least.

Trapping, however, with or without the use of D.D.T., which is effective enough on dairy farms, can never be expected to be as effective in beef cattle country, and unfortunately much of the area covered by the fly is given over to beef herds.

Cattle Tick and Tick Fever.—The tick has been fairly active, particularly on the coast, although the outbreaks outside the recognised permanently infested areas—the parasites having been carried past the clearing points by travelling cattle—have been mostly cleaned up. The situation, however, in respect of the arsenic-tolerant tick has not improved. The problem remains a very acute one, and has on occasions hampered the movement of cattle, particularly fats, which waste rapidly in certain circumstances.

Research workers who have been engaged on the problem have directed their energies chiefly towards finding a suitable medium for using D.D.T., which is very satisfactory in tick control under experimental conditions. It is hoped to extend this work and that it will be possible to incorporate the drug in the ordinary arsenical vat. A field

* From the *Annual Report, Department of Agriculture and Stock,* 1944-45.

trial is in progress, using nicotine sulphate with arsenic in combination. Nicotine has been reported by South African authorities as being very valuable in the control of the blue tick, a parasite very similar in its habits and life history to the Australian cattle tick, when used in combination with arsenic. It is yet too early to report on the results of this trial.

Tuberculosis.—The outstanding work in tuberculosis control in dairy stock has been an attempt to deal with the disease in the herds supplying raw milk for household distribution. Near the end of 1944 an amendment of the *Stock Diseases Act* to deal with this particular aspect of the tuberculosis problem was enacted.

Testing commenced in February, 1945, and by the end of June the position was as follows:—

Herds tested	193
Number of cattle	10,585
Reactors	1,442

The first test of a small number of herds has not yet been completed. All reactors are sent for slaughter. Compensation is paid to owners at the rate of £6 for cows and bulls over 2 years; £3 for heifers or bulls between 1 and 2 years; and £1 for calves. Cattle are paid for when replaced by others in the herd, replacements being admitted only after tuberculin tests which prove negative. Experience has indicated that there is very great difficulty in eradicating the disease in herds where it is well established, unless short interval testing is carried out.

In addition, a programme of testing was carried out on the Darling Downs. This scheme continued over a period of approximately six weeks, in the course of which 358 herds, comprising 15,418 animals, were submitted to the test. The incidence of disease was remarkably low.

This testing, completed in a remarkably quick time, indicated how very rapidly large numbers of animals can be dealt with when organisation is complete. Valued assistance was given to the Department by the Darling Downs Co-operative Dairy Association.

For the Royal National Association cattle show it was a requirement that all cattle entered must be from tubercle-free herds, or must be certified as having been recently tested and found negative. This ruling applied to all cattle, whether of beef or dairy breeds. Hitherto, only beef breeds had been placed in this category, but now dairy cattle also are included.

Apart from the testing already mentioned, this procedure has been confined to herds under the tubercle-free herd scheme, or in herds on farms from which tuberculous pigs have originated, and where the dairy herd has been suspected as the source of the infection.

McKenzie River Disease.—This condition, which has been known in certain parts of Central Queensland for very many years, has been further investigated. Proof has been obtained that the disease is caused by the ingestion of leaves of yellow-wood, a plant very common within

the area affected, i.e., the tributaries of the McKenzie River, hence its name. The symptoms produced are unusual. One of the first signs noted is the refusal of the animal to move out of the shade, or, in other words, photophobia is present. Associated with this are characteristic symptoms involving the urinary excretory system. Urine is frequently ejected and often accompanied by straining and arching of the back. Other symptoms noted are loss of condition, swelling of the under-skin tissues of the neck and brisket, and discharge from the eyes. Most, if not all of these symptoms, have been produced in experimental animals. The *post mortem* changes are quite characteristic, the kidneys being a blue to slate-grey colour, and on microscopic examination showing an unusual type of kidney inflammation. For very many years the plant had been regarded as a good fodder and animals frequently eat large quantities of the leaves when they fall towards the end of a dry season.

Brucellosis.—This disease is wide-spread throughout the dairy districts and is a problem of first importance. Considering the size of the industry, there are very few herds under the brucellosis-free herd scheme. Fortunately, some of these are among the best in the State. Many owners are fully cognisant of the danger involved in the purchase of animals, and in the case of high-priced stock it is becoming the usual practice to buy subject to test.

In the course of the year, more than 15,000 blood samples were submitted to the Animal Health Stations. Whole herds tested one or more times during the year were 108, and 42 of these were free of positive reactors. In most of the other herds the test and slaughter method gave satisfactory progress towards the eradication of the disease. However, this method of control has certain disadvantages in heavily infested herds, because—

(1) Such herds should be tested at short intervals and field officers are unable to do this, because of other duties or shortage of labour on the farms.

(2) Owners are often unable to bear the initial loss involved in selling for slaughter all the reactors. However, the present price of beef, together with the lack of man-power on farms, provided the conditions where many owners found it desirable to undertake eradication, particularly where the incidence was not more than 25 per cent. In six herds initial tests showed 30 to 50 per cent. of reactors and owners were unable to proceed with eradication. No attempt has yet been made to vaccinate with "Strain 19," although this is now available in Australia.

Pleuro-pneumonia contagiosa.—Outbreaks of this disease continued to occur everywhere throughout the cattle-raising districts. The complement fixation test has been applied to a large number of animals in the hope of discovering carriers. The outstanding result of these tests has been the surprisingly high number of animals showing evidence of the disease, as indicated by the test in comparison with the number showing symptoms. It is this particular characteristic of the disease—i.e., the large number of affected animals which show no evidence, combined with the circumstances under which cattle are maintained in this country, which makes pleuro-pneumonia a particularly difficult condition to control. Only where owners are willing to co-operate can any test be applied.

The usual procedure adopted in control is to quarantine and inoculate and then 60 days after the last clinical case has been noted raise the quarantine. It is obvious that such a procedure cannot be satisfactory where there are many affected animals which are not clinical cases.

There were 21 officially recorded outbreaks, but this does not represent the total, for the disease is enzootic over a large area, and on large properties particularly cases occur which are not detected. Vaccine was used extensively and more than 250,000 cattle vaccinated.

Miscellaneous.—Attempts to control mastitis in dairy cows have met with varying success. Some experimental work was carried out with sulphanilamide in oil and other drugs (udder infusions) as recommended by some American authorities, but results were disappointing.

Phosphate deficiency is suspected to be a cause of considerable infertility in dairy cattle in some areas, particularly along the coast. Some animals showed a low serum phosphate, while the addition of a phosphate supplement to the ration appears to have reduced the incidence.

Poisonous plants are very common throughout the State, and the yearly loss in the aggregate among all classes of stock must be considerable. The following plants have come under observation as causes of mortality in the course of the year:—

Poison peach (*Trema aspera*).

Wax flower (*Hoya australis*).

Wild passion vine (*Passiflora alba*).

Lantana camara.

Ellangowan poison bush (*Myoporum deserti*).

Bracken fern has been suspected on more than one occasion as the cause of mortality among young cattle on the coast.

Arsenical poisoning is, unfortunately, very common among cattle, and in one instance some valuable stud animals were lost.

An unusual mortality among dairy cattle occurred in the Malanda district (N.Q.). Twelve animals died over a period of two weeks. *Post mortem* showed an acute gastro-hæmorrhagic enteritis. Attempts to transmit the disease both by the inoculation of an emulsion of some of the organs, from a field case, and by drenching with bowel contents, appeared to be successful, though further transmission failed. All the cases referred to occurred on the one farm. Bacteriological and chemical investigation did not reveal the cause of the mortality.

Blackleg is very common and very wide-spread. On many properties vaccination is an annual practice.

Investigations into certain aspects of worm infestations of the intestinal tract of calves have been commenced, and work is nearly complete on a differentiation of the larvae of the different species. This will lead to further work on the epidemiology and pathogenesis of the different species. As in other years, outbreaks of worms among young cattle were reported during winter and spring and particularly heavy losses were recorded in some South Coast areas. Several species of parasites were implicated and phenothiazine used for control purposes.

Horses.

Ataxia.—This condition which has been known to exist in the Bowen district of North Queensland was again observed. The condition is of some considerable economic importance. A similar condition has been observed in the Bundaberg district, but the identity of the two conditions is still in doubt. Plant poisoning has been suspected.

Mortalities in horses have been reported from the Tallebudgera district of the South Coast. The symptoms noted are progressive, reaching their peak in about two months, when an attack is characterized by distressed breathing and profuse sweating. Attacks usually follow exertion. There is some evidence that the disease is associated with the ingestion of one of the mist weeds, two specimens of which (*Eupatorium adenophorum and E. riparium*) occur in the district.

A mortality occurred in the Richmond district, where more than twenty valuable horses died as a result of the ingestion of fibrous plants.

Tetanus is frequent in horses, particularly in the North, and vaccination is now more commonly practised.

Sheep.

Blowfly Extension Work.—Demonstrations and instruction were given at two special schools, one at Clermont and the other in the Richmond district. The performance of the Mules operation on properties which had not undertaken this work previously has been supervised, and in this way a further twenty-five owners and/or managers have been trained, and 50,000 sheep treated. At present, over 100 flock owners are known to be practising the Mules method as a part of regular station routine, and over one million sheep, most of which are depastured in the Central-West, have been treated. Constant follow-up work has been done to determine the results of the operation under field conditions. The concensus of opinion among graziers is that it reduces the incidence of crutch strike by about 90 per cent.

Tailing methods used at lamb-marking time have been examined carefully in some of the breeding areas, and a tendency to cut the tails too long has been observed. The importance of turning the bare skin from the under surface of the tail back over the severed stump is not realised by many flock managers, and more extension work is required to imbue those concerned with the efficiency of this practice.

Malignant Oedema of Wether Lambs.—Severe losses after lamb-marking were reported from properties in the North-West in the course of the winter of 1944. Over a dozen properties are known to have been affected with losses up to 50 per cent. Enquiry revealed that over a number of years post-marking losses of about 10 per cent. of wether lambs have occurred. Malignant oedema is suspected.

Infectious Labial Dermatitis (Scabby Mouth).—Infectious labial dermatitis occurred extensively throughout the sheep areas. Considerable industrial trouble arose through graziers repeatedly penning affected sheep for shearing and it would appear as though vaccination of all sheep againt the disease is the only remedy.

Pregnancy Toxaemia.—After the bountiful February (1944) rains in the Central-West, most graziers considered the season in that area to be assured, and mated their sheep accordingly. The unusual deterioration of the pastures during autumn meant that many ewes were on a

rapidly-falling plane of nutrition during the later stages of their pregnanacy and heavy losses from pregnancy toxoemia resulted.

Parasitic Conditions.

Blowfly Infestation.—Because of dry conditions in the Central and South-Western districts, blowflies have not been as bad as in some previous years. Considerable trouble was encountered in the North-West where seasonal conditions were good. There the Mules operation is not well-established and labour shortages made the adoption of reasonable preventive measures difficult.

Lice.—The foot louse of sheep (*Linognathus pedalis*) was reported from widely-distributed places in the Central and North-Western districts. Outbreaks were apparently sporadic and usually only one or two sheep on each property were seen to be affected.

Concern is felt over the spread of the body louse (*Bovicola ovis*) into the downs country in Central and North-Western areas. A carefully-planned educational campaign to acquaint graziers with the potential danger of louse spread and more stringent administration of regulations is proposed.

Trombidiosis of Sheep.—A dermatitis of parasitic origin and affecting certain parts of the legs of sheep depastured on the black earths of the Central Highlands was reported. Research work was carried out on the occurrence and control of the condition, and the causative mite (*Trombicula sarcina*) has been studied. Nymphal stages have been recovered from soil experimentally infested with engorged larvae. The nymphs were seen 13-16 days after engorgement of the larvae. Initial experiments indicate that di-butylphthalate promises well as a control agent.

Epidemiology Surveys.—The epidemiology surveys are still in progress. Seasonal variations in the worm burdens have been studied in the areas where the large stomach or barber's pole worm, the small stomach worm, or large bowel worm occur. The data so far collected indicates that while the large stomach (or barber's pole) worm is far more prevalent during summer, the severity of outbreaks is dependent on the incidence of suitable weather conditions. Stomach and large bowel worms are essentially winter complaints, but the occurrence of outbreaks is governed by rainfall. This work is of a long range nature and is expected to continue.

Diseases related to Toxic Substances—Fluorosis.—Further survey work to define the areas of the State where stock suffer from chronic endemic dental fluorosis as the result of drinking bore water containing fluorine has been undertaken. Investigations have been confined chiefly to the Central-West and have consisted of the examination of sheep for clinical signs of fluorosis, a determination of the economic importance of the condition and the collection of water samples for confirmatory evidence. Three large belts of countries, where fluorided bores are found, are known.

Fluorosis is of considerable importance in that the majority of bores known to be affected are in some of the most important breeding areas, and sheep are being subjected to a regular fluorine intake during the critical period of enamel deposition.

Pig Diseases.

Tuberculosis.—This is very common in the State and is the cause of much economic loss. Figures for slaughtering throughout the State indicate that 0·72 per cent. of the animals were condemned entirely for this disease. The value of the condemned animals, if healthy, would be, in the aggregate, very high.

The source of infection is mostly the dairy cow on the farm, but there has been one instance where pigs fed on slaughter-house offal and having no contact with cattle showed a high incidence. The animals in this piggery were subjected to the single intradermal test, and out of 64, no fewer than 40 reacted. Animal inoculation showed the organism to be of the bovine type. All animals showed lesions on *post mortem*. A second test carried out three months later, and covering 32 animals, 18 of which were in the piggery at the time of the first test and were negative at that test, produced eight more reactors among these originally negative animals. Among the 14 pigs added to the piggery since the test, four reacted.

Erysipelas.—Only one case was diagnosed during the year. This occurred on a property on which the disease had been previously diagnosed. The disease has now been diagnosed on three properties in the State. Only the arthritic form of the disease has been seen. A survey to determine the extent and type of infection is necessary, as the condition can easily become one of serious economic importance.

Brucellosis.—Sixteen herds have been tested by the agglutination test. Selected pigs only have been tested on other properties, and in one of these a heavy infection was found. Of the whole herds tested five showed some infection. Satisfactory control was achieved by regular testing.

This year for the first time the Royal National Association decided to admit no pig to its annual show unless it had come from a brucellosis-free piggery, or, when not so, that it had been recently tested and found negative.

Salmonella Infection.—Pneumonia due to *Salmonella cholerae suis* is the commonest infectious disease of pigs encountered in the field. The septicaemic form of the infection (paratyphoid) caused some concern at bacon factories, because *S. cholerae suis* is known to be pathogenic to man. A number of specimens have been submitted from bacon factories for bacteriological examination. There is a need to extend such work.

Two outbreaks of acute polyarthritis due to *Salmonella cholerae suis* were diagnosed.

Specimens from a heavy mortality following vaccination with mixed swine plague vaccine (Australian) were examined. Infection with *Clostridium septigue* and *Salmonella cholerae suis* had apparently occurred at the site of inoculation and produced a haemorrhagic cellulitis and septicaemia.

Mortalities from Eating Caterpillars.—Mortalities among pigs associated with eating the caterpillars of a butterfly, *Anaphaeis java teutonia,* were reported from Mundubbera. This butterfly breeds on Capparis spp.—in this case *C. mitchelli.* The larvae of allied species of butterflies have been recorded as poisonous to stock in other countries.

Poultry Diseases.

Pullorum Disease—Birds numbering 128,000 were tested for pullorum disease, with a percentage of 3.4 reactors. In 19 hatcheries there were no reactors, and in 20 others the percentage was less than 1. In addition, 14,000 tests were carried out for farmers on birds used for breeding purposes. In these there were 6.1 per cent. reactors.

In the hatching season—July to December, 1944—74 lots of young chickens were examined bacteriologically and pullorum disease was diagnosed in 39. There was a big increase in the number of chickens hatched during the season and this contributed to the increased number of cases of pullorum disease diagnosed. Most cases of the disease occurred in chicks hatched from flocks in which eradication by blood testing was either not attempted or undertaken without the necessary thoroughness.

Examination of chickens from registered flocks being tested under the departmental scheme showed that satisfactory control of pullorum disease is being achieved in these flocks.

Coccidiosis.—Several factors contributed to an increase in the number and severity of outbreaks of coccidiosis in chickens 2 to 4 months old. More chickens were reared than in previous years, and on many farms the accommodation was unsatisfactory, or the owners, being new to the industry, were unaware of hygienic measures which must be adopted to control this disease. Both caecal coccidiosis (*Eimeria tenella*) and intestinal coccidiosis (*E. necatrix*) were common.

Nutritional Deficiencies in Chickens.—Wartime shortages of various ingredients (meat and dried milk products) of poultry rations resulted in many nutritional deficiencies coming under notice. Deficiency of protein of animal origin was not uncommon in growing chickens; vitamin A deficiency also was common. Deficiency of vitamins of the B complex also came to notice in young chickens. Nutritional troubles caused considerable loss to the poultry industry and probably increased the severity of many outbreaks of coccidiosis and respiratory infections. There is a need for biochemical investigation and feeding experiments to be done with the rations used for poultry in Queensland.

Respiratory Infections.—Some infections of the respiratory tract (commonly called "roup" by poultry farmers) are now recognised as disease entities, but little research has been done to determine which of these occur in Queensland.

Fowl pox is widespread in commercial flocks, but vaccination has not been extensively used as a control measure. Field trials on vaccination in commercial flocks and laboratory investigations on the preparation of efficient vaccines are proposed. Fowl pox causes serious losses in turkeys in Southern Queensland, at least, and in this species also vaccination trials would be worthwhile.

An infection of chickens 10 to 16 weeks old and characterised by catarrh of the nasal cavities and sinuses and sometimes tracheitis, was common during the 1944 rearing season. The morbidity was high, but mortality was low in the absence of complications such as coccidiosis and nutritional deficiency. Some investigation of this disease was undertaken, but shortage of staff and facilities hampered the work. Under experimental conditions the disease was reproduced by intratracheal

inoculation of exudate from the trachea of affected birds. Birds which had recovered from the disease were susceptible to a strain of infectious laryngo-tracheitis virus obtained from the New South Wales Department of Agriculture. The disease under investigation has been commonly called infectious catarrh in Australia, but it would seem more correct to call it infectious bronchitis, the aetiology of which has been determined in America. Work on the problem is proceeding.

Infectious laryngo-tracheitis is a common cause of serious loss in poultry in New South Wales and Victoria, and it is important to determine whether it occurs in Queensland. If so, it can be efficiently controlled by vaccination. The acute type of the disease has not come to notice, but some of the outbreaks of the type described in the preceding paragraph may be caused by the I.L.T. virus and the matter calls for investigation.

Fowl Cholera.—On a farm in the Brisbane district, respiratory disease complicated by disease of the central nervous system was investigated several times in the course of the year. Fowl pox and vitamin A deficiency caused much mortality in this flock, but in addition the fowl cholera bacillus (*Pasteurella avisceptica*) was present and commonly caused abscesses, oedema of the wattles, and inflammation of the air sacs and nasal cavities. In some cases the organism spread to the meninges and the brain producing symptoms of meningitis. At one period, the fowl cholera bacillus alone was responsible for cases of inflammation of the nasal cavities and sinuses and the brain. These birds showed coryza and peculiar head and neck movements and eventually became comatose and died. Fowl cholera can be controlled only by flock management and hygienic procedures.

Several outbreaks of fowl cholera in ducklings were diagnosed.

Fowl cholera was the cause of heavy mortality in turkeys on the Darling Downs.

Avian Leucosis Complex.—The various manifestations of this disease are the commonest cause of mortality and culling in adult fowls.

Spirochaetosis.—Several outbreaks of this disease were met with in various parts of the State.

Parasites.—From departmental experience in this and in past years, it is evident that little is being done to overcome the losses caused by worms and external parasites. Heavy infestations of *Ascaridia galli* and tapeworms are seen much too frequently.

An interesting parasite of pigeons, new to Australia, was recently encountered. This was the pigeon fly, *Pseudolynchia canariensis.* This hippoboscid is a blood sucker and in other countries is the cause of serious losses. It is also a vector of pigeon malaria, *Haemoproteus colombiae.*

Ants.—Mortalities among birds, associated with the ingestion of large numbers of *Monomorium rothsteini* were reported on two occasions. The ants were mainly winged forms. Previously the green head, *Chalcoponera metallica,* and meat ant, *Iridomyrmex detectus,* were implicated in poultry mortalities in this State.

QUEENSLAND CHEESE PRODUCTION—Supplied by the Division of Dairying.

YIELD AND GRADINGS OF CHEESE IN ALL FACTORIES FOR TWELVE MONTHS ENDED 30TH JUNE, 1945.

Factory.	Milk Received.	Production and Yield.					Gradings of Cheese.				
		Cheese, Green Weight.	Butterfat.	Cheese Yields.		Average Test.	Total Submitted	Choice.	First.	Second.	Third.
				Per 100 Lb Milk.	Per Lb. Butterfat.						
	Lb.	Lb.	Lb.	Per Cent.	Per Cent.	Per Cent.	Lb.				
Aubigny	1,586,853	166,919	58,768	10·51	2·84	3·7	146,908	..	112,883	34,025	..
								..	76·83%	23·16%	..
Biddeston	7,920,420	853,903	295,529	10·78	2·89	3·73	668,014	27,487	563,749	76,778	..
								4·11%	84·39%	11·49%	..
Coalstoun Lakes	1,902,460	190,658	72,584	10·02	2·62	3·81	74,399	..	2,583	52,262	19,554
								..	3·47%	70·24%	26·28%
Daredale	2,673,689	257,212	97,248	9·62	2·64	3·64	271,271	..	148,315	112,083	10,873
								..	54·67%	41·31%	4·01%
Downs Association—Boodua	2,274,769	236,194	88,376	10·38	2·67	3·88	184,269	..	149,297	34,972	..
								..	81·02%	18·98%	..
Toowoomba	..	..	..	..	..	..	708,703	..	244,423	423,718	40,562
								..	34·48%	59·78%	5·72%
Dundarrah	1,333,709	127,709	49,330	9·57	2·58	3·70	23,585	..	..	23,585	..
								..	..	100·0%	..
Felton	5,660,990	604,920	215,143	10·68	2·81	3·8	437,596	..	2,059	304,797	130,740
								0·47%	69·65%	29·87%	..
Greenmount	2,653,631	282,670	103,083	10·65	2·74	3·88	132,580	..	62,210	68,220	2,150
								..	46·92%	51·45%	1·62%
Highgrove	2,354,100	242,695	90,807	10·30	2·67	3·86	170,839	..	3,503	164,824	2,512
								..	2·05%	96·48%	1·47%
Irongate	5,038,874	525,540	189 916	10·42	2·77	3·77	489,547	13,680	383,689	88,018	4,169
								2·79%	78·37%	17·97%	0·85%
Kelvinhaugh	2,544,031	261,542	97,399	10 28	2·69	3·83	249,964	..	209,397	40,567	..
								..	83·77%	16·23%	..
Kooroongarra	4,591,631	462,412	169,980	10·07	2·72	3·70	460,605	12,431	316,478	124,470	7,226
								2·7%	68·71%	27·02%	1·57%
Lilyvale	2,919,043	316,626	111,130	10·84	2·85	3·81	306,932	..	295,712	11,220	..
								..	96·34%	3·65%	..
Maclagan, Kulpi	7,069,438	722,982	263,563	10·22	2·74	3·73	600,321	..	435,976	156,462	7,883
								..	72·62%	26·06%	1·31%
Maclagan, Maclagan	8,613,651	883,176	321,293	10·25	2·75	3·73	736,617	..	438,707	294,070	3,840
								..	59·55%	39·92%	0·52%
Maryborough—Kingaroy	663,949	56,532	24,309	..	..	..	26,901	..	15,146	11,755	..
								..	56·3%	43·69%	..
Tansey	5,131,935	534,988	211,438	10·42	2·53	4·12	274,604	14,766	257,012	2,826	..
								5·37%	93·59%	1·02%	..
Wondai	2,274,683	210,196	90,263	9·24	2·32	3·97	97,825	..	84,060	13,765	..
								..	85·92%	14·07%	..
Maxam	5,824,804	635,791	232,514	10·91	2·73	3·99	444,645	..	376,817	67,828	..
								..	84·74%	15·25%	..

Moola	4,418,028	451,841	161,845	10·23	2·79	3·66	304,023	563	246,710	56,750	..
								0·18%	81·14%	18·66%	..
Mount Sibley	3,120,066	334,972	119,670	10·73	2·80	3·83	332,463	15,236	290,298	26,929	..
								4·58%	87·31%	8·09%	..
Mount Tyson	7,450,543	785,872	279,793	10·54	2·81	3·75	484,612	16,552	463,214	4,846	..
								3·41%	95·58%	1·00%	..
Pittsworth—											
Brookstead	2,889,717	301,817	109,282	10·44	2·76	3·78	365,210	..	151,657	210,966	2,587
								..	41·52%	57·76%	0·71%
Linthorpe	3,863,568	390,824	144,599	10·11	2·70	3·74	270,580	..	178,842	91,185	553
								..	66·09%	33·69%	0·2%
Pittsworth	8,964,180	945,258	355,053	10·54	2·66	3·96	683,228	60,207	590,717	32,304	..
								8·81%	86·45%	4·72%	..
Scrubby Mountain	2,881,132	297,404	109,483	10·32	2·71	3·79	54,186	..	43,332	10,854	..
								..	79·96%	20·03%	..
Springside	3,452,733	363,420	127,243	10·52	2·85	3·68	282,946	40,213	223,944	18,789	..
								14·21%	79·14%	6·64%	..
Yarranlea	6,152,326	628,163	230,127	10·21	2·72	3·74	474,646	1,760	345,204	124,731	2,951
								0·37%	72·72%	26·27%	0·62%
Port Curtis—											
Bracewell	3,554,026	333,451	117,571	9·38	2·83	3·3	161,247	..	129,256	31,991	..
								..	80·16%	19·83%	..
Theodore	2,704,481	283,937	100,608	10·49	2·82	3·72	16,882	..	15,402	1,480	..
								..	91·23%	8·76%	..
Kraft Walker, Quinalow	7,198,546	721,827	267,650	10·02	2·69	3·71	634,841	..	448,278	186,563	..
								..	70·6%	29·4%	..
Ramsay	2,430,438	243,490	92,061	10·01	2·64	3·78	227,430	..	164,340	63,090	..
								..	72·2%	27·7%	..
Rockview	2,550,911	267,458	99,230	10·48	2·69	3·88	241,373	..	178,359	63,014	..
								..	73·8%	26·1%	..
Rocky Creek	3,070,490	313,574	114,748	10·21	2·73	3·73	298,124	..	174,600	122,897	627
								..	58·5%	41·2%	0·2%
Rosemount	3,571,329	339,035	137,882	9·49	2·46	3·86	262,373	..	152,846	109,527	..
								..	58·2%	41·7%	..
Southbrook	7,601,730	790,019	284,108	10·39	2·78	3·73	593,796	9,990	541,779	40,653	1,374
								1·68%	91·23%	6·84%	0·23%
South Burnett—											
Goomeri	5,487,278	559,519	216,314	10·19	2·58	3·94	397,551	..	313,177	84,374	..
								..	78·77%	21·22%	..
Murgon	5,833,560	575,361	223,027	9·86	2·57	3·82	350,734	..	331,814	15,480	3,440
								..	94·6%	4·41%	0·98%
Sugarloaf	2,069,925	204,327	84,289	9·87	2·42	4·07	153,595	..	117,355	35,500	740
								..	76·4%	23·11%	0·48%
Sunnyvale	2,379,106	243,216	90,233	10·22	2·69	3·79	137,157	..	8,837	123,105	5,215
								..	6·44%	89·75%	3·8%
Warwick—											
Greymare	2,886,721	288,466	106,785	9·99	2·70	3·69	4,628	..	..	4,628	..
								..	..	100·0%	..
Talgai	1,691,831	172,595	64,014	10·2	2·69	3·78	24,954	..	2,398	22,556	..
								..	9·6%	90·39%	..
Victoria Hill	930,095	97,124	33,485	10·44	2·90	3·6	4,924	..	3,818	1,106	..
								..	77·53%	22·46%	..
Mill Hill	18,112,440	1,674,902	615,712	9·24	2·72	3·39	532,061	..	448,299	74,653	9,109
								..	84·25%	14·03%	1·71%
Woodleigh	2,356,409	236,114	87,848	10·02	2·68	3·72	223,608	..	123,028	100,101	479
								..	55·01%	44·76%	0·21%
Yamsion	3,589,852	389,099	135,058	10·83	2·88	3·76	369,231	..	189,050	178,821	1,360
								..	51·2%	48·43%	0·36%
Yargullen	4,425,866	463,243	167,779	10·46	2·76	3·79	362,237	551	256,973	103,092	1,621
								0·15%	70·94%	28·45%	0·44%

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which qualified for entry into the Advanced Register of the Herd Books of the A.I.S. and Jersey Societies. Production records for which have been compiled during the month of September, 1945. (273 days' production unless otherwise stated.)

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Alfa Vale Lovely 17th	W. H. Thompson, Nanango	12,288·3	452·572	Penrhos Pansy's Pride
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Alfa Vale Laura 6th	W. H. Thompson, Nanango	12,824·65	569·021	Penrhos Pansy's Pride
Trevor Hill Caramel 3rd	Geo. Gwynne, Umbiram	7,938·34	325·169	Rosenthal Musketeer
Rhodesview Kitty 21st	W. Gierke and Sons, Helidon	6,599·25	278·899	Fairvale Major
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Trevor Hill Janet 4th	A. H. Webster, Helidon	6,410·75	264·512	Balater Czar
JERSEY.				
MATURE COW (STANDARD 350 LB.).				
Oxford Delphine	Burton Bros., Wanora	7,927·82	440·22	Oxford Golden Peer
Lermont Hope	P. H. Schull, Oakey	8,216·45	415·851	Belgonia Lady's Duke 2nd
Westbrook Tulip 104th	Farm Home for Boys, Westbrook	7,120·3	412·603	Westbrook Ambassador 28th
Orphanage Pearl 15th	Farm Hone for Boys, Westbrook	7,759·7	383·777	Rowallan Celebrity
SENIOR, 4 YEARS (STANDARD 330 LB.).				
Glengarriffee Fenian Cavil	J. J. Ahern, Conondale	7,462·5	391·016	Glengarriffee Cunning Fenian

Senior, 3 Years (Standard 290 Lb.).				
Westbrook Sultane 8th	Farm Home for Boys, Westbrook	8,651·8	379·885	Orphanage Comet
Romsey Pixie's Choice	J. Wilton, Killarney	6,847·4	336·6	Oxford Pixie's Victor
Junior, 3 Years (Standard 270 Lb.).				
Lermont Tinklebell	J. Schull, Oakey	6,387·7	335·374	Selseys Samaris Hallmark
Weston Vale Carming Lass	W. and M. Allen, Gympie	6,775·15	302·41	Claredon Eyre Eminents Sorcerer
Senior, 2 Years (Standard 250 Lb.).				
Romsey Angelina	J. Wilton, Hillarney	6,365·8	319·131	Oxford Pixie's Victor
Junior, 2 Years (Standard 230 Lb.).				
Glenrandle Dairymaid	P. Kerlin, Killarney	6,536·6	391·405	Bellgarth Stylish
Richmond Camilla 3rd	F. Eager, Petrie	4,844·1	266·732	Richmond Volunteer
Weston Vale Likely Girl	W. and M. Allen, Gympie	4,667·9	258·815	Claredon Eyre Eminent's Sorcerer 9th
Weston Vale Fairy Floss	W. and M. Allen, Gympie	4,922·05	253·796	Claredon Eyre Eminent's Sorcerer 9th
Weston Vale Dewdrop	W. and M. Allen, Gympie	5,185·1	247·062	Claredon Eyre Eminent's Sorcerer 9th
Weston Vale Honour's Cheerful Girl	W. and M. Allen, Gympie	4,336·1	243·945	Edgely Phil
Ashview Lady 3rd	C. Huey, Sabine	4,221·95	234·63	Trecarne Victor 4th

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Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Rhodesview Queenie 27th	W. Gierke and Sons, Helidon	6,862·6	313·569	Fairvale Major
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Arolla Velvet 3rd	W. Hinrichsen, Clifton	9,725·5	412·421	Parkview Limerick
Ardilla Flower 12th	W. Hinrichsen, Clifton	6,427·75	286·34	Newstead Reliance
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Ardilla Gwen 7th	W. Hinrichsen, Clifton	6,245·5	268·422	Newstead Reliance
Arolla Dawn 3rd	J. Crookey, Allora	6,103·75	257·983	Parkview Highbrow
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Bingleigh Molly 7th	J. C. Meier, Mount Mort	8,848·55	363·005	Blacklands Emblem
Alfa Vale Queenie	W. H. Thompson, Nanango	8,516·0	340·603	Reward of Fairfield
Glen Idol Daphne 13th	Estate of P. Doherty, Gympie	6,955·65	320·042	Blacklands Banker
Trevor Hill Jeanette 3rd	Geo. Gwynne, Umbiram	7,893·08	318·018	Sunnyview Emminent
Trevor Hill Nectarine 2nd	Geo. Gwynne, Umbiram	6,424·85	257·305	Sunnyview Emminent
Sunnyview Ringlet 2nd	A. Lohse, Degilbo	6,802·35	250·304	Sunnyview Envoy
JERSEY.				
MATURE COW (STANDARD 350 LB.).				
Windsor Lady Ann	Johnson Bros., Gleneagle	7,309·35	373·197	Brooklands Sultan's Victory
Romsey Larkspur	J. Wilton, Killarney	6,683·0	367·937	Morago Rivoli Prince

Senior, 4 Years (Standard 330 Lb.)				
Peeramon Princess Winnie	N. Harris, Ravenshoe	6,742·95	380·683	Trinity Segunda's Prince
Romsey Brown May	J. Wilson, Killarney	6,542·7	355·616	Oxford Dainty Peer
Peeramon Pretty Jane	W. A. and D. White, Perramon	6,581·55	342·248	Peeramon Lucky Boy
Romsey Joyful Maid	J. Wilton, Killarney	5,457·8	334·49	Oxford Dainty Peer
Junior, 4 Years (Standard 310 Lb.).				
Glenrandle Fair Lass (246 days)	P. Kerlin, Killarney	5,983·55	339·061	Bellgarth Stylish
Senior, 3 Years (Standard 290 Lb.).				
Hocknell Silver Belle	E. Harmer, Beaudesert	6,963·9	387·044	Trecarne Master Silvermine
Strathdean Carnation	S. H. Caldwell, Bell	6,757·25	366·5	Strathdean Xenia's Lad
Strathdean Melba	S. H. Caldwell, Bell	6,866·52	354·087	Navua Ladoras Ruler
Hocknell Waimate Babette	E. Harmer, Beaudesert	6,784·5	325·864	Hocknell Golden Surprise
Navua Zanzibar's Fern	F. Eager, Petrie	5,178·95	303·566	Dreamer's Hamptonne Star
Junior, 3 Years (Standard 270 Lb.).				
Woodview Fairy Girl	P. H. Schull, Oakey	5,304·7	313·659	Lermont Victory
Senior, 2 Years (Standard 250 Lb.).				
Strathdean Amber	S. H. Caldwell, Bell	6,222·63	352·665	Navua Ladora's Ruler
Junior, 2 Years (Standard 230 Lb.).				
Glenrandle Brown Beauty	P. Kerlin, Killarney	5,894·8	315·737	Bellgarth Stylish
Ashview Peal	C. Huey, Sabine	4,783·8	278·432	Ashview Some Prince
Ashview Gem	C. Huey, Sabine	4,607·35	260·014	Ashview Some Prince
Romsey Pixie	J. Wilton, Killarney	4,644·3	240·609	Oxford Pixie's Victor

GENERAL NOTES

In Memoriam

LAWRENCE DANIEL CAREY.

The death of Mr. L. D. Carey, Chief Inspector of Stock for Queensland, on 7th November at his home in Auchenflower, Brisbane, is recorded with great regret.

Born in 1889, the late Mr. Carey's boyhood years were lived on the Darling Downs. In February, 1918, he entered the service of the Department of Agriculture and Stock as a stock inspector; in October, 1920, he was appointed a district stock inspector; in 1935, Staff Inspector; in November, 1939, Acting Chief Inspector of Stock on the retirement from that office of the late Lieut.-Colonel A. H. Cory; and in June, 1940, Chief Inspector of Stock.

The late Mr. Carey was well known throughout Queensland. He was stationed successively at Canobie, Aramac, Cloncurry, Emerald, Toowoomba, and Brisbane. Apart from his official duties among stock, cattle particularly, he took a keen interest in rural industries generally. In all centres in which he served, he was prominent in the social life of the community including membership of hospital committees and active association with every progressive movement. His staff appointments took him to every district in which inspectors are stationed, and few men had a wider knowledge of the State and its rural resources. In his younger days he was a Rugby footballer of note and was prominent in other sporting fields.

Before the commencement of the fat stock sales at Cannon Hill on the day after his death, sympathetic reference was made to the sad and untimely occurrence and all present observed a minute's silence as a mark of respect and of sympathy with his bereaved family.

References in Parliament.

In the Legislative Assembly the Minister for Agriculture and Stock, Hon. T. L. Williams, said that the loss of Mr. Carey was very keenly felt by him personally and by the Division of Animal Industry particularly and the Department generally. Mr. Harry Walker, M.L.A., a former Minister, also expressed his sincere sorrow at the passing of Mr. Carey, a severe loss by which many were bereft of a good friend. Mr. E. B. Maher, M.L.A., added an expression of deep regret and a tribute to the memory of a man who had been a very valuable officer whom he had held in high regard, both for his personal qualities and administrative capability.

From an Old Subscriber.

Mr. Robert McCredie, of Injune, writes under date 21st November:—

"For over a quarter of a century I have been receiving the *Queensland Agricultural Journal*, but, to-day I have come to the parting of the ways. . . . . I am about to retire. I am a primary producer no longer.

"I took to the land in 1892 and have taken the good with the bad as it came, though I have had few holidays. I am pleased to say in spite of all ups and downs I shall not require the old age pension. So, *Agricultural Journal*, adieu! Carry on the good work! Thank you, and good luck!"

May our old subscriber have many years of health and happiness in his retirement.

Rural Topics

Pig Yards.

Pig yards should be large enough to enable the pigs to have plenty of exercise. Except in the final period of topping up, when exercise is restricted, the animals should have a free run. Pigs are far more healthy when grazed in paddocks than when enclosed in pens.

Where it is not convenient to run the pigs over large areas, and they are confined to small yards, a system of alternate yards gives good results. Under this system when one yard becomes foul from constant use by the pigs it can be ploughed or dug up, limed, and a green or root crop sown, the pigs being transferred to another yard. When the crop is up the pigs may be returned to that yard and have the benefit of the crop, while the yard just vacated can then be treated in the same way. This serves the double purpose of cleansing and sweetening the soil and providing some green food. When the same yards are used for long periods without being rested, the soil becomes a source of infection for various microbic and parasitic diseases.

Co-operation in Sweden.

Co-operation between individual farmers in production and selling has become a striking feature of Sweden's agricultural economy. Seed cultivation and stock breeding societies exist in every province, while, besides butter factories, flour mills, meat works and sales organizations are to a large extent owned by co-operative associations. Every Swedish farmer who has anything to sell is a member of one kind of society or another. These societies are united in national organizations representing the different branches of agriculture, which in turn combine to form the Agricultural Federation of Sweden. The functions of the Federation include representation of the agricultural co-operative movement in its relations with the State and with other industries, and the conduct of market research which serves as a basis for regulating prices and concluding agreements and for the formation of future agricultural policy. The Federation also conducts educational work and has its own publishing house and correspondence college and arranges conferences and training courses in rural districts all over Sweden.

The Piggery Site.

When choosing a site for a piggery, effective drainage should be a first consideration. The site should have a gentle slope, without being steep, and if the aspect is to the east, it will be so much the better in the greater part of the State. The drainage should be of a surface kind, the result of the fall or slope, and should not depend upon underground drains, which are apt to get choked up and can never be kept in the same sanitary condition as those to which the sunlight has access. If there is a piece of rough ground on the farm that is conveniently situated and otherwise satisfactory it may be very suitable for the piggery. Regard must be had, too, for the position of the residence, for if the prevailing winds carry the smell of the piggery to the dwelling, one or other will probably have to be moved quite soon. Light, absorbent, sandy loams are preferable to stiff clays or soils with a clay subsoil.

Sheepskin Possibilities.

It is believed that there is a possibility of increasing our post-war trade by making up sheepskins into rugs, carpets, and imitation fur coats. By a recently-discovered process, the wool of a sheepskin can be transformed into a fur which cannot be distinguished, except by the expert, from high-priced natural furs. This process has, it is said, gone well beyond the experimental stage and is regarded as an outstanding development (according to a news bulletin from the Victorian Department of Agriculture) in the utilization of sheepskins and will make possible the manufacture in Australia of a valuable substitute for fur in the making of winter coats for the export market.

Sheepskin carpets, too, have come to stay. With the present available outturn of 25 million sheepskins in Australia every year, there are evidently possibilities of adding another asset to the pastoral industry.

GADGETS AND WRINKLES

CARE OF LAMP WICKS.

New lamp wicks and washed old ones may be boiled in vinegar to prevent smoking. Bowls and burners should be boiled occasionally in strong soda water and then dried thoroughly before being refilled, since any water in the fuel causes flickering. In lighting a lamp, turn the wick only part way up, as too rapid heating may crack the chimney. Wait until the cloudiness on the chimney, due to dampness in the air, has disappeared before turning the flame to full height.

There is no advantage in turning the flame low because the same amount of oil is used and an unpleasant odour results. Shade the lamp if less light is desired. To extinguish the flame, turn the flame low and give a quick puff across the chimney top, rather than to blow down, so as to avoid smoking up the chimney.

SKIM MILK FEEDING MADE EASY.

As described in the *New Zealand Journal of Agriculture* for June*, a Northland farmer, Mr. R. McKay, of Taipuha, has contrived a method of feeding skim milk which is both simple and clean. The receptacle is an ordinary 40-gallon drum with an opening from end to end, with one side hammered into shape, forming a convenient spout for pouring, as illustrated. The drum is held in a cradle made with 4-in. by 2-in. cross-bars held in position by three iron bolts. The handles of the cross-bars are simply bolted to the end of the drum. The whole outfit is pivoted on two short axles, mounted on bearings on two wooden posts set into the ground. If preferred, the axles could be engaged in bearings cut direct into the two wooden posts.

1. The drum in filling position.

2. Showing the drum being turned for pouring the skim milk.

In the illustration, the drum is shown with the end to end opening under the skim milk pipe, and so arranged that it will overflow when half filled. The drum is held in position with a few links of chain fastened to the post and engaging with a hook at the bottom of the cross-bar. The holding capacity of the drum can thus be adjusted according to whichever link is hooked. The outfit is placed conveniently alongside the feeding bails. When operating the outfit, the chain may be adjusted

* N.Z. Jour. Agr. Note by P. S. Syme, Instructor in Agriculture; Vol. 70, No. 6, p. 631.

so that the drum will hold just the amount of skim milk required. Since the opening is visible from the shed, the froth on the milk will indicate when it is about to overflow, and the supply can be shut off.

3. Calf-feeding bails, showing partitions between the bails. The bail bars are simply operated by a length of chain. The receptacles are galvanised iron troughs made specially for calf-feeding.

When feeding the milk, the drum is revolved by the cross-bar handle, so that the milk flows evenly through the spout into the feeding bucket. As it can be so easily and conveniently emptied to the last drop and can save a lot of messy work and can be made so cheaply by any handy man—the chief materials are only a few pieces of 4-in. by 2-in. timber and an empty 40-gallon drum—the device commends itself.

NEATSFOOT OIL FOR HARNESS.

For keeping harness pliable and in good order, neatsfoot oil needs no recommendation to farmers. Neatsfoot oil is made by boiling in a suitable container the feet and leg bones (up to the knees) of well-grown cattle, and which should first be thoroughly cleaned by scalding and scraping off all hair and dirt. The feet and leg bones should then be covered with water, which should be brought to the boil and then allowed to simmer for about two hours. After the oil has risen to the surface, it should be skimmed off and the mixture boiled again for a second skimming.

The oil thus obtained should be strained through a piece of cheese cloth, to remove particles of meat. The strained oil should then be boiled again, care being taken that it does not catch fire. Finally, the oil should be strained again, cooled and bottled. Pure neatsfoot oil should be light lemon in colour. This method is for manufacture on a small scale only. Manufacture of neatsfoot oil for trade purposes requires the use of a much more detailed and tedious process.

CEMENTED BAG BUILDINGS.

The chaff or patoto sack can be turned to good use in the building of fowl-houses or similar farm buildings of light construction according to the following plan, which has proved successful in practice:—

A framework of timber is first of all built up, after which wheat or cement bags are opened out and stretched very tightly over it, being nailed down with ⅝-inch clout tacks. Next, a mixture is made up as follows:—Water, 1¼ gallons; cement, 12 lb.; lime, 2 lb.; salt, 1 lb.; alum, ½ lb. (In damp or wet weather use 1 pint less water.)

Sieve the salt and lime together through a fine sieve—to thoroughly mix the materials and get rid of any big lumps—add the water and then the cement—stirring while adding—and finally the alum. Wet the stretched bags with water and apply the mixture without delay using a fairly stiff brush, first on the outside, and then on the inside. Before the mixture sets, but after the initial wetness disappears, apply a second coat to the outside. When this sets, the bags will be quite hard and stiff, somewhat like plaster board. Subsequent coatings will, of course, make a stronger board.

Care of Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

CHRISTMAS AND THE HOLIDAYS.

ALL parents have been reading, no doubt, the advice of Government and Municipal Medical Officers as to how to build up children's resistance against infection. One particular point of the advice is to allow children to have plenty of fresh air and sunshine and keep them out of crowded places. The children will soon be home for the holidays and wise mothers and fathers will be thinking of the best way to keep them happy and amused in their own garden, or, if no garden is available, in the nearest park or play-space.

Having the right kind and amount of exercise and play helps to build up the physical, mental, and moral health of children, and so the matter is worth some serious thought. Children should play as long as possible every day in the open air, and when the weather does not permit of going outdoors, a sheltered corner of the verandah or a room with windows wide open should be used for play.

Exercise is important because—

1. It makes the heart beat faster, speeding up the flow of blood through the body, and so carrying more food to all the tissues and bringing back more waste materials to be thrown off by the lungs and kidneys.

2. It makes the child breathe faster and more deeply, thus bringing more air into the lungs and more oxygen into the blood.

3. Causes sweating and thus helps to get rid of waste through the skin.

4. Increases the appetite and helps digestion.

5. Helps make the muscles hard and strong, adds grace to the body and aids correct posture.

6. Helps protect against certain kinds of sickness.

Every boy wants to grow into a strong, healthy young man. Every girl wants to grow into an attractive, healthy young woman. Most great men keep physically fit by exercise and good health habits.

Walking is an excellent exercise, and this should be encouraged and made interesting by pointing out to children the beauties of nature and explaining the various things they see as they go along. If the grown-ups can tell them about birds and flowers and scenery, so much the better.

The children are eagerly looking forward to Christmas, so what about adding to the interest of their "fresh air" holiday by giving outdoor toys as presents, or perhaps some can be made for them? Children love to use a hammer and nails and a carpenter's bench made in the shape of a cross with a box of nails fixed

in the centre will keep several kiddies happy for a long time. The little carpenters stand at each end and hammer the nails into pieces of soft wood to their hearts' content. There is no danger of their hitting each other, and since they naturally hold the hammer near its head, small fingers are fairly safe.

A slippery slide is another thing of which toddlers are very fond, and as it encourages them to climb, and is quite safe, it is a good thing to set one up in the back yard. A push-car is very simply made, and gives a lot of amusement; and a wheelbarrow with which to cart away stones or lawn clippings is always popular. Any further advice on the making of these and other toys or where they may be purchased can be obtained by communicating personally with the *Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane*, or by addressing letters *Baby Clinic, Brisbane*. These letters need not be stamped.

IN THE FARM KITCHEN.

Vegetable Variations.

Parsnip Pie.

Take 2 lb. of parsnips, ½ oz. butter, ½ oz. flour, salt, pepper, ¼ lb. chopped cheese, ½ cup water from boiled parsnips. Wash and peel parsnips, boil till tender, strain and mash them. Melt butter, stir in flour and when smooth add water. Stir till it boils, add parsnips, half the cheese, seasoning. Put remainder of cheese on top, and brown pie in oven 15 minutes.

Turnip Puff.

Mix 2 cups mashed yellow turnips with 1 cup mashed potatoes. Season to taste with a little sugar, salt, pepper, butter. Add 2 beaten egg yolks; beat until fluffy. Fold in 2 stiffly beaten egg whites. Put in mounds on a greased baking sheet. Bake in moderate oven (375 deg. F.) until brown.

Curry of Vegetables.

Take 2 lb. potatoes, carrots, onions, or other root vegetables, mixed. Make a sauce by frying a cut-up onion in 1½ oz. dripping. Add sufficient curry powder and 1 oz. flour, and continue frying for two or three minutes. Add ¾ pint of stock, and bring to the boil, stirring well. Add a chopped apple, salt and pepper, and 1 teaspoon chutney. Cover and simmer gently for about 15 minutes. Meanwhile, prepare and cut up the root vegetables. Add these to the sauce and cook gently for about an hour, stirring occasionally to prevent the sauce from sticking, and adding more stock if necessary. Delicious when served with boiled rice.

Curried Potatoes.

One and a half lb. of boiled potatoes, 1 large onion, 1 oz. of dripping, 2 teaspoons of curry powder, 2 teaspoons of flour, 2 teaspoons of chopped chutney, ½ pint of vegetable stock, 1 teaspoon of vinegar, salt. Thickly slice and cut the potatoes into large cubes. Chop the onion. Melt the dripping, put in the onion, and fry it a pale yellow. Add the curry powder and flour, and fry all a good brown. Then add the stock, chutney, and vinegar, and stir till boiling. Season, and then simmer for 15 minutes. Add the potatoes and let them heat through, but do not let them boil or they will break up. Let simmer for 10 minutes at least. Turn neatly on to a hot dish, and, instead of rice, serve with them a well-cooked, chopped and nicely seasoned piece of cabbage. Until you have tasted this you can have no idea how nice it is.

Spinach De Luxe.

To cook spinach in the French way, remove the stalks and wash it well. Throw it into boiling salted water, bring to the boil, and boil for 10 to 15 minutes. Drain it in a colander and plunge it at once (to preserve the colour) into a bowl of cold water. Now take it out in handfuls and squeeze them so as to press out as much water as possible. Put the pressed handfuls on a board and chop them finely. Then put the chopped spinach into a clean cloth and wring it from the ends, so that all water is squeezed out. Then put the spinach into a saucepan with just enough melted butter to prevent its catching, and let it dry until no more steam rises, but be careful to see that it does not burn. Mix it, if desired, with a little cream before using. Cooked in this way, about 2 lb. of spinach will be required for four people.

ASTRONOMICAL DATA FOR QUEENSLAND.

JANUARY, 1946.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	4.56	6.46	Cairns	49	8	Longreach	43	27
6	5.00	6.47	Charleville	29	25	Quilpie	33	37
11	5.04	6.47	Cloncurry	63	36	Rockhampton ..	18	2
16	5.08	6.47	Cunnamulla ..	28	31	Roma	19	15
21	5.12	6.46	Dirranbandi ..	16	22	Townsville	40	9
26	5.16	6.45	Emerald	27	12	Winton	51	30
31	5.20	6.43	Hughenden ..	48	22	Warwick	3	5

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	2.53	4.49
2	3.35	5.44
3	4.23	6.38
4	5.15	7.29
5	6.10	8.17
6	7.09	9.02
7	8.09	9.43
8	9.09	10.20
9	10.10	10.57
10	11.11	11.32
	p.m.	a.m.
11	12.12	..
12	1.15	12.10
13	2.21	12.49
14	3.27	1.33
15	4.34	2.22
16	5.38	3.16
17	6.38	4.16
18	7.31	5.19
19	8.17	6.23
20	8.58	7.25
21	9.34	8.24
22	10.07	9.21
23	10.38	10.15
24	11.08	11.08
25	11.40	Noon
		p.m.
26	..	12.52
	a.m.	
27	12.13	1.46
28	12.40	2.40
29	1.30	3.34
30	2.15	4.28
31	3.05	5.21

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS)

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17 Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	25	12	42	27	16	2	48	30
6	27	13	43	28	18	2	50	31
11	17	22	33	38	8	13	37	43
16	11	28	26	43	0	19	28	52
21	15	24	31	40	7	15	35	46
26	25	14	41	30	16	5	47	34
31	29	11	44	25	19	0	52	28

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	44	8	60	36	45	22	36	9
3	52	5	66	34	50	20	43	7
5	51	7	65	36	49	21	42	8
7	45	15	61	41	45	26	37	15
9	35	25	54	47	39	32	29	22
11	24	35	47	55	32	40	21	30
13	10	44	38	60	23	46	10	37
15	7	48	36	62	21	48	8	40
17	7	50	36	63	21	49	8	43
19	12	47	39	62	24	47	12	39
21	20	40	44	57	29	42	18	34
23	29	31	51	51	35	36	25	26
25	39	21	56	45	41	30	33	19
27	43	12	59	39	44	24	36	13
29	48	6	63	35	48	21	40	8
31	52	5	66	34	50	20	43	7

PHASES OF THE MOON.

New Moon, January 3rd, 10.30 p.m.; First Quarter, January 11th, 6.27 a.m.; Full Moon, January 18th, 12.46 a.m.; Last Quarter, January 25th, 3.00 p.m.

January 23rd the Sun will rise and set 20 degrees south of true east and true west, respectively, and on January 10th and 23rd the Moon will rise and set approximately true east and true west, respectively.

Venus.—This month, Venus, in the constellation of Sagittarius and Capricornus, will be too close in line with the Sun for observation.

Mars.—At the beginning of the month, Mars, in the constellation of Cancer, will rise an hour or two after sunset, about 25 degrees north of true east; and may be seen low in the west during morning twilight. On the 23rd it will pass about 4 degrees north of Saturn and a little to the south of Castor and Pollux. At the end of the month it will rise before sunset and may be seen in the east during evening twilight, setting between 3.30 a.m. and 4.30 a.m., about 28 degrees north of true west.

Jupiter.—This planet, near Spica, in the constellation of Virgo, at the beginning of the month will rise soon after midnight, about 10 degrees south of true east. At the end of the month it will rise between 10.30 p.m. and 11.30 p.m.

Saturn.—Saturn, at the beginning of January, will be visible low in the western sky during morning twilight, setting shortly after sunrise. At the end of the month it will rise before sunset and be visible in the eastern sky during evening twilight.

Earth in Perihelion.—On January 2nd the earth reaches the point in its orbit when it is nearest the Sun. This point is called perihelion and the distance from the Sun, 91,500,000 miles. It should be remembered that it is not because the Sun is nearer us that we experience summer. At this time of closest approach the northern hemisphere is having its winter. It was explained in the March, 1945, and July, 1945, issues that the earth being tilted to the plane of its orbit causes the seasons. As the earth moves in its orbit the hemisphere turned towards the Sun receives the more direct rays and consequently more heat.

Partial Eclipse of Sun.—On January 3rd there will be a partial eclipse of the Sun, but it will be viewed by very few people as the area from which it will be visible is the sparsely populated regions adjoining the South Pole. At the maximum phase about half of the Sun's disc will be obscured by the moon.

QUEENSLAND WEATHER IN NOVEMBER.

November is normally a period of fairly general thunderstorms in Queensland, but only a comparatively small area was affected and the last of the 1945 spring months must be recorded as exceptionally dry over the greater part of the State. Well favoured sections were the Moreton, Darling Downs and Maranoa Divisions, where a rain spell of inestimable value to agricultural, dairying and pastoral interests was experienced between the 16th and 20th. Many two to four inch falls were registered, several exceeded four inches and there were a few over five inches. Such visitation, supplemented by scattered useful storms during the second and last weeks of the period, caused the month's aggregates for these divisions to be not far short of average, the deficiencies in the eastern Downs and Moreton districts being only 8 per cent. and 11 per cent. respectively. The Port Curtis and Central Highlands and North Coast (Herbert) Divisions (which fared fairly well in October) received some good storm rains, but, except at a few very isolated places, precipitation in all other divisions was negligible, especially on the Peninsula and in Western and Far South West districts, where the period was practically rainless.

Thus the month closed with seasonal conditions satisfactory in the south-eastern quarter of the State, reasonably so (though very dry locally) in the central and northern tropical coast areas, but with severe drought conditions still prevailing in southern border districts west from the Downs and with the need for rain very acute or becoming so in all western and northern pastoral areas.

The mid-month rain spell on the Downs interfered to some extent with harvesting, but the greater part of the crop had been harvested and agricultural authorities anticipate a splendid yield of excellent grain.

Some heavy local damage was caused by hail, especially in the Sunnybank (metropolitan) area on 12th when loss of crops and damage to property amounted to thousands of pounds.

Monsoonal low pressure activity was mainly of the inland shallow trough formation, with associated tropical dips operating at times in conjunction with the passage of southern depressions. Outstanding features were the persistence of an anticyclone over the Tasman Sea between 13th and 20th (maintaining a pronounced easterly to north-easterly wind stream over Queensland coastal and adjacent districts) and the maintenance of a pronounced high pressure wedge over western divisions from 17th to 20th (maintaining a cool south-easterly air flow there for several days). It was this distribution of pressure which resulted in the only seasonable widespread rain spell of the month.

The rainfall position is summarised below—

District.	Normal Mean.	Mean Nov., 1945.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	199	17	91 below
Peninsula South	220	27	88 ,,
Lower Carpentaria	148	40	73 ,,
Upper Carpentaria	153	35	77 ,,
North Coast, Barron	298	185	38 ,,
North Coast, Herbert	353	165	53 ,,
Central Coast, East	206	80	61 ,,
Central Coast, West	161	89	45 ,,
Central Highlands	220	147	33 ,,
Central Lowlands	148	57	61 ,,
Upper Western	105	3	97 ,,
Lower Western	90	3	97 ,,
South Coast, Port Curtis	272	125	54 ,,
South Coast, Moreton	357	316	11 ,,
Darling Downs East	277	256	8 ,,
Darling Downs West	232	171	26 ,,
Maranoa	211	177	16 ,,
Warrego	147	63	57 ,,
Far South-West	109	1	99 ,,

Commonwealth of Australia Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

OCTOBER RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.,	No. of years' records.	Oct., 1944.	Oct., 1945.		Oct.,	No. of years' records.	Oct., 1944.	Oct., 1945.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	0·90	42	0·85	1·23	Gatton College	2·06	44	0·76	Nil
Cairns	2·06	61	1·97	0·68	Gayndah	2·37	72	0·58	3·07
Cardwell	1·95	71	1·42	1·90	Gympie	2·73	73	1·58	2·70
Cooktown	1·60	67	0·49	0·56	Kilkivan	2·68	62	0·58	1·31
Herberton	0·93	57	0·59	1·08	Maryborough	2·73	72	1·21	2·04
Ingham	1·80	51	1·35	2·82	Nambour	3·23	47	1·99	3·89
Innisfail	3·12	62	2·96	5·30	Nanango	2·19	61	1·03	1·93
Mossman	2·59	19	2·59	3·58	Rockhampton	1·78	72	0·62	2·34
Townsville	1·25	72	0·47	0·85	Woodford	2·53	55	2·42	1·56
Central Coast.					*Darling Downs.*				
Ayr	0·87	56	0·43	2·01	Dalby	2·01	73	0·79	0·61
Bowen	0·97	72	0·12	1·11	Emu Vale	2·18	47	0·89	0·90
Charters Towers	0·71	61	1·42	2·70	Jimbour	1·88	64	0·61	1·45
Mackay	1·76	72	0·46	5·10	Miles	2·00	58	0·82	0·40
Proserpine	1·53	40	0·50	3·39	Stanthorpe	2·50	70	1·10	1·18
St. Lawrence	1·76	72	0·50	3·99	Toowoomba	2·54	71	0·80	1.70
South Coast.					Warwick	2·32	78	1·23	0·59
Biggenden	2·49	44	0·72	4·48	*Maranoa.*				
Bundaberg	2·07	60	1·28	1·99	Roma	1·73	69	0·63	0·76
Brisbane Bureau	2·59	93	1·49	2·73	St. George	1·29	62	0·38	0·35
Caboolture	2·73	67	2·75	3·27	*Central Highlands.*				
Childers	2·71	48	1·21	3·03	Clermont	1·28	72	0·06	2·45
Crohamhurst	3·38	50	3·02	2·67	Springsure	1·62	74	0·16	4·08
Esk	2·60	56	1·43	1·62					

CLIMATOLOGICAL TABLE FOR OCTOBER.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric Pressure Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	84	67	87	12, 18	60	7	0·68	8
Herberton	..	79	57	86	7, 8, 30	50	3, 4, 7	1·08	6
Townsville	..	83	68	87	30	53	2	0·85	9
Rockhampton	30·07	83	60	90	16	46	4	2·34	6
Brisbane	·08	78	59	88	10	47	3	273	8
Darling Downs.									
Dalby	..	80	53	88	14	34	3	0·61	5
Stanthorpe	..	71	44	80	15, 26	29	3	1·18	7
Toowoomba	..	73	50	82	9, 15	32	3	1·70	6
Mid-Interior.									
Georgetown	29·97	95	67	99	29	55	2, 5	0·45	2
Longreach	30·04	90	61	98	6, 7	47	2	0·46	3
Mitchell	30·03	82	52	90	8, 14	36	3	1·11	5
Western.									
Burketown	..	92	67	98	29	56	2	Nil	..
Boulia	29·98	88	62	102	23	48	20	0·47	4
Thargomindah	30·01	81	59	92	15	47	2	1·05	4

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